

7 Gestalt Theory II: Part-Whole Interdependency

7.1 Perceptual Meaning: B. Pinna

A good way to begin with the ontological determination of PWO as involving part-whole interdependence in perception and maybe also beyond is by focusing on the parameter of *meaning*. To do so, it is worthwhile to take a look at the recent research by B. Pinna in this regard. In a number of partly co-authored publications, Pinna¹ suggests what seems to be a major shift within the Gestalt theoretical paradigm of the primacy of the whole at the expense of the singularity and heterogeneity of parts. As we have seen, this primacy of the whole is safeguarded by the empirical evidence of Gestalt principles of grouping, particularly by the meta-principle of *Prägnanz* which – put simply – measures the goodness of a Gestalt by means of its regularity and lawfulness. Pinna however argues that principles of grouping, as well as the segmentation of figure and ground,² are only one of three forms of organization by which we immediately perceive an entity as a Gestalt. The other two forms of organization are shape and perceptual meaning: “Human perception goes beyond the perception of appearances and figures versus backgrounds. It is mostly perception of shapes and meanings that are at the basis of the construction of perceptual ‘objects.’” [Pinna et al. 2010: 288]

How does shape differ from grouping? According to Pinna et al. [id.: 318], the “form of grouping puts together the elements, while the form of shape draws the perceptual structure and spatial attributes of the figure both locally and globally.” For example, while the four lines of a perceptible square, firstly, have to be segregated from a background on which they appear and are, secondly, the square’s elements that are grouped together according to principles such as *similarity* (the four lines have an equal length), *proximity* (the closer the endpoints are to each other, the more unitary the square becomes) and *closure* (a perfect square is a closed region), the square, as such, is a shape that organizes our perceptual field like it is organized by figure-ground and grouping relations.³ But also, the line itself already has a shape and can, on the basis of this shape, be grouped with *similar* shapes. Within our perceptual field, there is thus a hierarchical relation of perceptual steps that make a perceived entity appear as a unitary whole via the crossing of different levels: “The first perceptual step is the ‘segregation’ of each component from the background. The second one is ‘putting together’ or grouping the segregated elements in homogeneous wholes on the basis of similarity of shape.” [Pinna et al. 2009: 228] In addition to the principles of grouping, this second step involves specific principles for shape formation, i.e. shape properties that are not explainable by grouping principles, such

¹Cf. Pinna et al. [2009; 2010; 2010; 2011b; 2011a; 2014].

²Cf. section 7.4 below.

³Cf. Pinna [2011b: 384].


as a shape's sidedness, pointedness, headedness and organic segmentation.⁴

This means that not only grouping, but also shape formation accounts for the unity and lawfulness of a Gestalt, which is why the more innovative extension to the view of the primacy of the whole without falling back into the primacy of the part à la Ehrenfels only happens in the third and fourth step:

“The third is the complementary ‘separation’ and the clear distinction of the wholes on the basis of dissimilarity. Similarities and dissimilarities lead to the fourth and final step, where all the differentiated wholes and each single element are put together again by virtue of another and more global grouping factor that overcomes the dissimilarities of the components: it is some kind of *meaning* principle that perceptually solves the differences among wholes and elements at a higher level making them appear strongly linked just by virtue of the differences. In this way similarities and dissimilarities complement and do not exclude each other. This can be the level where the perceptual meanings are established.” [id.: 228–9]

According to this progression of perceptual steps, which actually are “arbitrary phenomenal separations of a perceptual result that appears indivisible” [id.: 229], to imbue a Gestalt with perceptual meaning presupposes the recognition of a whole's parts not only as participating in this whole's homogenous unity, but also as embodying a heterogeneous diversity through which the proper nature and role of a part *as* part is significantly increased. This seems to be an important move not only beyond lawful integrity as the (only) perceptual and ontological measure of a good Gestalt, but also beyond former tendencies either to *reduce* the notion of meaning to ‘past experience’,⁵ or to define the meaning of a Gestalt *in terms of* its lawful integrity and thus as a purely structural feature.⁶ To show how perceptual meanings instead *emerge*⁷ from structural features of grouping and shape formation, Pinna employs “a free-report (phenomenological) method in which untutored, naïve subjects are given a carefully-chosen series of visual stimuli and asked to report anything they see.” [id.: 232]⁸ The figures of the visual stimuli thus serve as (potential) visual proof of the occurrence of the three forms of organization: figure-ground/grouping, shape, and perceptual meaning.

7.1.1 Meaning as Happening of the Parts to the Whole

To effectuate this proof in a simple way, Pinna provides, among others, square-like figures. He argues that the prototype of a square looks as follows:  If you tell somebody to draw a square, there is a high chance that this person will draw it like this, and in order to describe this figure,


⁴Cf. the overview in Pinna [2011b: 415].

⁵Cf. Rausch's seventh aspect of *Prägnanz*. Even Pinna himself regards it as a potential disadvantage of his notion of ‘perceptual meaning’ that it might necessitate past experience: “The cons of perceptual meanings are that the process of their formation is strongly related to cognitive processes placed at a higher level and involving past experience. For these reasons it can be difficult to separate perceptual from cognitive meanings.” [Pinna et al. 2009: 268]

⁶Cf. Koffka [1925: 546] and Rausch's [1966: 946] first aspect of *Prägnanz*.

⁷Cf. section 7.3 on what emergence entails in this context.

⁸For the precise experimental arrangement, cf. Pinna et al. [2009: 233–4] and Pinna [2010: 12–14]. Subsequent to this phenomenological method, Pinna also uses a quantitative method of scaling, in which a second group of subjects rates the descriptions of the first one on a scale from 0 to 100.

only one word is needed: ‘square’. This shape therefore has a ‘phenomenal singularity’, which Pinna defines as “the instance of a shape that does not need to be defined by attributes and that correspond[s] to a one-word description. In other words, the phenomenal singularity is *the best instance* of a specific shape.” [Pinna 2011b: 388] With this square as a starting point, we can firstly see that the organizational form of the shape might change while the grouping principles of the elements remain the same. By rotating the shape by 45°, for example, we receive the shape  which relies on the same grouping principles and which is as phenomenally singular as the square, but to which another one-word description corresponds: ‘diamond’. This is also known as Mach’s square/diamond illusion, “according to which the same geometrical figure is perceived as a square when its sides are vertical and horizontal, but as a diamond when they are diagonal.” [id.: 390] Pinna explains this illusion by postulating certain principles of shape organization, viz. pointedness and sidedness.⁹ These principles do not belong to the category of grouping principles, but likewise arrange for a percept’s homogeneity.

Secondly and beyond both grouping and shape, however, we can see that when we rotate the square only a little bit ($\sim 10\text{--}35^\circ$), then the rotation does not result in another stable phenomenon such as a diamond, but remains a square: a ‘rotated square’. This means that more than one word is needed to describe this shape and that the additional word ‘rotated’ functions as an attribute that specifies what *happens* or *happened* to the shape.¹⁰ Thereby, analogous to the relation between an adjective/verb and a noun in a sentence, the relation between the attribute and the shape is asymmetrical: It is not possible that the shape happens to the attribute.¹¹ At the same time, however, shape and attribute “define themselves reciprocally” [id.: 389] such that one cannot be perceived without the other. This attributable notion of *happening*, which is perceptible and describable the more a Gestalt does not display a perfectly homogeneous grouping and regular shape, is what gives perceptual meaning to a Gestalt. It divides the perceived structure into two or more parts (e.g. a square and a rotation) and then combines these parts again to a meaningful whole: Something must have happened to the square.

Of course, being rotated is not the only thing that can happen to a square, and normally more than two words are needed to describe the happening. Pinna presents a whole list¹² consisting of figures “where the square and its sides or angles appear as beveled, broken, crashed, gnawed, deliquescing, deformed, protruding”, whereby the “changes and happenings can be seen as depending on or related to specific and ‘invisible’ but perceptible causes affecting the shape

⁹“If a square shape is made up of sides and angles, then it shows phenomenal properties such as ‘sidedness’ and ‘pointedness’ related to these components. These two properties are only apparently equipollent. The square/diamond illusion demonstrates the vividness asymmetry between these properties. In the square the sidedness appears stronger than the pointedness, while the diamond shows more strongly the pointedness. [...] In fact, in all the conditions illustrated sidedness and pointedness are not in contrast but either the sidedness or the pointedness are attenuated or emphasized, thus weakening only one of the two effects. This entails that one of the two singularities is weakened, therefore appearing as a rotation of the other.” [Pinna 2011b: 395–6]

¹⁰Cf. id. [389].

¹¹“A rotation cannot have a shape, while the shape can have a rotation. This suggests a clear asymmetrical hierarchy between the two terms. The shape is primary, earlier in time and order than the rotation. Therefore, the shape is a noun and as such it is a word generally used to identify a class of elements. As a noun, the shape is like ‘a thing’, which can appear in many different ways, and the rotation is one of this ways of being of the shape, i.e. the attribute of that specific thing.” [id.]

¹²Cf. Pinna [2009: 251; 2010: 55; 2011b: 387].

and the material properties of the square. They add visual meanings but do not really change the shape of the square, which is perceived like the amodal invariant shape supporting all those happenings [...].” [id.: 387] For example, while test subjects describe a square whose upper right corner is replaced by an irregular zigzag line as “shattered like a windowpane” and “made of glass” [Pinna et al.: 2009: 250], the replacement of the corner by a roundish doodle makes subjects describe the square as “expanding and spreading some dense liquid matter” [id.: 252] Such meanings in terms of happenings are neither reducible to grouping nor to shape, but are instead “directly and immediately perceived without any cognitive mediation but as a result of some kind of part-whole organization eliciting perceptual meanings [...].” [id.: 247] Furthermore, in many cases the resources provided by natural language are insufficient to describe the perceptual meaning, which allows Pinna to presume that perceptual meaning is prior to propositional meaning.¹³

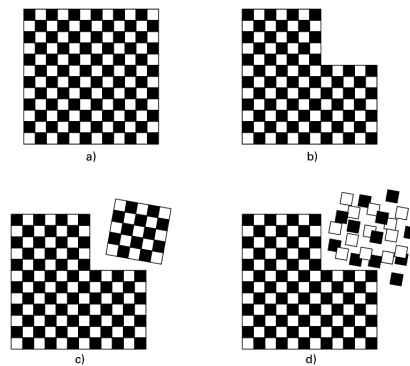


Figure 7-1: *Meaning as happening*¹⁴

Pinna further demonstrates the way in which the organization of parts and whole creates perceptual meanings by letting subjects describe variations of a checkerboard. Figure 7-1 shows a complete checkerboard, which is already, before anything ‘happens’ to it, neither reducible to the form of shape nor to principles of grouping, because the “alternation [of black and white squares, M.S.] creates some kind of homogenous structure with a precise meaning. This meaning is not due to its being a checkerboard because we know and use it as a checkerboard; rather, we know and use it as a checkerboard because it has that meaning.” [Pinna et al. 2010: 324] But the meaning the checkerboard displays becomes even stronger as soon as it seems to undergo or to have undergone any changes, i.e. as soon as something (a change, a cause, an influence, a former or later state) is immediately seen although is not actually given, neither as stimulus, nor as group, nor as shape. In the case of b), for example, beyond the 135 stimulus parts, beyond the alternative of a black or a white background/foreground, beyond the two groups of black and white parts based on the *similarity* principle, and beyond the shapes of these parts as squares as well as the shape of the whole as a geometrical figure with six borders, what subjects perceive and describe is a ‘mutilation’ of the complete checkerboard, caused by a ‘removal’ of a ‘large piece’ from the top right corner.¹⁵

¹³This presumption is congruent with the distinction between $\text{meaning}_{\text{prop}}$ and $\text{meaning}_{\text{perc}}$ drawn in subsection 4.1.1 above.

¹⁴Reproduced from Pinna et al. [2010: 326]. These figures are reprinted courtesy of The MIT Press from *Perception beyond Inference: The Information Content of Visual Processes*, edited by Liliana Albertazzi, Gert J. van Tonder, and Dhanraj Vishwanath. The reproduction is kindly permitted by MIT Press.

¹⁵Cf. Pinna et al. [2010: 324].

What completes the checkerboard is here defined by the absence of the whole's part and by the accentuation this absent part gives to the whole. Without the absent part, the whole itself would be incomplete. Thus there has to be a distinction between part and whole in order to make both the part (as a removed element) and the whole (from which an element is removed) meaningful in perception. This necessity of part-whole distinction in which both define each other's meaning is also the case when the parts are present but not connected to the whole by grouping and shape, such as in c) and d). Instead of seeing two different wholes of grouped parts and two distinct shapes in c), or a whole of grouped parts, a whole of ungrouped parts and various shapes in d), both c) and d) appear as unified figures in which something happens to the whole in its upper right corner. This is because "in the form of meaning, even different elements like these are put together and assume a meaningful kind of organization [...]. In the form of meaning, anything can stay with anything else and become meaningful, provided that the invariants are maintained." [id.: 328] As long as the invariant checkerboard as the subject of the happening is maintained, we can even perceive a static instance of it as actually being in movement, i.e. as standing in a complete temporal sequence of which only an incomplete snapshot is given.¹⁶ Participants of the experiment thus described the separated part in c) as 'tumbling down'¹⁷, whereas the scattered squares in d) 'seem to fly'.¹⁸ Of course, the parts do not actually fall down or fly away, but it is the plausibility of this interpretative as-if character and its immediacy in perception that vivifies the phenomenon and stimulates the observers' ability to make sense even of seemingly disparate and unorganized impressions.

Examples like these show a remarkable feature of meaningful part-whole organization: the simultaneity of *amodal completion*, which makes a whole complete on an ideal level, and *modal incompleteness*, which occurs on a contingent level due to the deviation from the ideal level via happenings in the parts. In this simultaneity, the "ideal and contingent levels are not perceived in the same way: the former is perceived amodally, the latter modally. The complete *whole* (the square) is seen amodally (amodal completeness), while the incomplete *whole* (irregular shape) modally (modal incompleteness). Similarly, the complete *part* (the absence that at the ideal level is filled with what is missing) is perceived amodally, while the incomplete *part* (the absence as it is perceived) modally. Both ways coexist and reinforce each other." [Pinna 2010: 58] It is worth noting that in this distinction between the contingent and the ideal level, Pinna defines as part of a whole the absence of a part itself. It is this absence, which is one of a whole's parts, that determines the character of the whole and vice versa. It even seems that absence not only refers to the invisibility of a part, but also to the invisible cause of a part's absence or a part's removal, such as in c), and to a temporal sequence, for example of shattered parts flying away in d). In the latter case, it is the perceptible yet invisible absence of the temporal sequence that is a part of the Gestalt, whereas the temporal sequence itself is a whole for which the momentarily visible Gestalt is a part. Thus via one of its parts, a whole becomes itself a part.¹⁹ Absence, instantiated by a happening, is thus both the reason for a whole's separation

¹⁶"The temporal structure of the presentation, therefore, has to be considered as a constitutive component of the field structure of perceptual phenomena because it is in the extension of an act of seeing that we apprehend the being-before or being-after of phenomena, or simply their permanence." [id.: 325]

¹⁷Cf. id. [324].

¹⁸Cf. id. [325].

¹⁹"In fact, the information pertaining to the act or process of elongation is not given by the static image but by a series or succession of implicit images (snapshots of evolution), of which the given image is a *nonindependent*

into parts (one of which is the absence itself), and the reason for the unification of parts and whole on an ideal level. In Pinna's own words:

“From the previous figures, it follows that the form of meaning and its processes of meaning assignment obey apparent antinomic rules. On the one hand they put together everything, so that everything can stay with everything else in a meaningful way. This imparts unity, integrity and homogeneity among all the components. On the other hand, they divide, segregate or break the homogeneity, thus appearing as the opposite of unity, integrity and homogeneity. These two antinomic dynamics are not equivalent to the grouping/segregation formed by the gestalt principle of similarity placed at another perceptual level. In the form of meaning the two dynamics do not annul or weaken but strengthen each other by creating the two perceptual levels (ideal and contingent) we previously mentioned. Therefore, what is segregated becomes the happening, i.e. something different from the main meaning (subject). The happening is discounted but at the same time it becomes part of the subject by qualifying it and explaining in terms of action the reason for the loss of homogeneity, integrity and unity of the subject. In this way the subject can assume, establish or restore its homogeneity that is like a basic assumption within the process of meaning formation. In other words, differences, variations and lack of homogeneity become the special emerging meanings that we called ‘happenings’, whose aim is to create homogeneity and, hence, unity. The paradox of meaning is avoided by creating and organizing the resulting meanings in the two perceptual levels already mentioned: amodal/ideal and modal/contingent.” [Pinna 2010: 66]

Here lies the most important aspect for the context of the present project. Through the introduction of perceptual meaning into the Gestalt discourse, the primacy of the whole in a purely structural sense is accompanied by a fundamental role played by the parts. These account for the heterogeneity, i.e. meaningful many-sidedness of what can happen or has happened to the homogeneity of the whole. Only this interplay and mutual reinforcement of ideal unity as ‘amodal wholeness’²⁰ and contingent discontinuity as ‘modal partialness’²¹ can be the presupposition for a higher level of unity, a unity that unites structural whole homogeneity (what a Gestalt is in the traditional sense) and part heterogeneity (what a Gestalt is not or is less in the traditional sense). In the face of this mutual part-whole interplay that is connected to the appearance of perceptual meaning, we could say that neither the rather atomic, pre-Gestaltist conceptualization of parts holding that *many are many*, even if agglomerated, is fully correct. Nor is it appropriate to exclusively hold with the rather traditional Gestaltists the view that *many should be one* to be a ‘good’ Gestalt. In combining both as a fruitful antinomic tension, the integration of meaning as happening in perception enables the idea that *many become few*, which is one of the main properties of perceptual meanings: “Through the form of meaning many elements are reduced to few integrated meanings.” [id.: 72]

part and to which it implicitly refers.” [Pinna 2010: 323]

²⁰“We call ‘amodal wholeness’ the vivid percept of object unity and wholeness even though the observer does not actually see a contour in regions where the completion of the whole object occurs at a level after the ‘happening’.” [id.: 69]

²¹“We call ‘modal partialness’ the clear modal emerging of a specific happening that occludes the completion of one part of the complementary region, such as a square, that appears as the whole.” [id.]

7.1.2 Many Become Few, But Not One

The idea of *many become few* contains some of the essential characteristics of meaning in perception. Firstly, ‘many’ points to the fact that in order to perceive visual meanings, it is not sufficient to notice only a whole as an ideal entity that is primary to and determinative for its parts. For a Gestalt to have meaning entails noticing parts of it that are either dissimilar to the whole, such as a zigzag line that replaces the edge of a square; or absent from the whole, such as a missing piece of a checkerboard; or standing apart from the whole, such as a number of unordered squares that seem to fly away from the whole. It lies in the nature of a happening to evoke perceptible discontinuities between parts and whole: “Every happening is a discontinuity that accentuates one or more properties of the main shape. This discontinuity gives meaning to the shape [...]. Furthermore, in the same way as the happening (the geometrical discontinuity) imparts a meaning to the shape, the shape imparts a meaning to the discontinuity.” [Pinna 2011b: 414]²²

Secondly, ‘become’ indicates the just-outlined temporal process of meaning assignment in the course of the happening. In theory, this process continues even after the interplay of figure-ground/grouping/shape principles and part-discontinuity has resulted in the assignment of perceptual meanings, because every addition or removal of a part, i.e. every change of a Gestalt’s properties, as well as every new relation of a Gestalt with another Gestalt, might result in new meaning assignments. Pinna calls this property of the form of perceptual meaning its ‘high connectedness’: “The form of meaning can involve a large number of components with many feedback loops that enable the system to restructure promptly. By comparing one figure with another, the emerging form of meaning can change depending on whether it is perceived alone or compared with a new figure. This is because the new figure becomes a new component and therefore part of the whole meaning.” [Pinna 2010: 71] Perceptual meanings are thus always in an actual or latent state of becoming, i.e. they possess a high degree of variability,²³ and, in addition, it is impossible to perceive without meaning, since “[e]ven the most senseless pattern creates and communicates a meaning.” [Pinna 2010: 72]

This does not mean, however and thirdly, that the pitfall of an infinite proliferation of meanings persists. The ‘few’ indicates that out of the complex manifold of every Gestalt’s part-part, part-whole and whole-whole relations, only a few possible perceptual meanings do in fact result. Although new meanings are always possible due to the restructuring and interrelating of a Gestalt and due to the perceptibility of heterogeneity and discontinuity, which also allows for creativity and novelty, it is the essential characteristic of meaning in perception that it is economical in nature. Not all possible meanings are equally plausible, and simplicity absorbs complexity such that “[d]iscontinuities, divergences, contrasts, and paradoxes are solved and ‘explained’ within a whole meaning. The components are restructured in a meaningful manner: The discontinuity becomes the predicate (happening) of the subject (amodal meaning).” [Pinna et al. 2010: 336] Furthermore, once a perceptual meaning is attributed to a Gestalt, this

²²Cf. also Hoffman et al. [1984], who points out that and why our visual system recognizes objects by decomposing their shapes into parts along the shape’s contours. The step from a grouped or shaped whole to its partitioning is thus also significant in the field of visual object recognition, which might correlate with the structurally similar move towards part-articulation for the development of perceptual meanings.

²³“The happenings manifest chaotic behaviors, in the sense that very tiny variations in the happenings can induce a huge variation in their meanings. This implies a great instability that is the source of mutations and creativity of the meanings. This is the basis of the creativity of vision.” [Pinna 2010: 71]

meaning is resistant to changes, which means that the process of happening often leaves a particular meaning intact instead of constantly creating new meanings. This is the invariability of perceptual meaning, which does not contradict but reinforces its equally essential variability²⁴ and which allows for a veridical description by observers.²⁵ Although Pinna does not explicitly address the problem of infinite proliferation, we can reason from this that instead of creating meanings *ad infinitum* and in so doing implying (an ultimately meaningless) relativism, the process of happening leads to a stable yet flexible finiteness and therefore communicability of a Gestalt's actual range of meanings.

To conclude, Pinna's introduction of perceptual meaning into the Gestalt discourse both makes possible a conception of two-sided part-whole dependency and in so doing accounts for the positive (\oplus) and negative (\ominus) aspects of the previously discussed Gestalt theories of one-sided dependency.²⁶ To begin with the latter, it emphasizes the temporal development of a Gestalt's meaning over time (\oplus_1 , \ominus_3) by placing it in the sequence of a happening, in which the whole functions as a subject and one or more of its parts as 'visual predicates'. The happening makes the whole contingent and heterogeneous (modal partialness). At the same time, it makes perceptible the absence of the whole's ideal state (amodal wholeness) that it would have had if it only fell under the principles of grouping and shape. The togetherness of present modal partialness and absent amodal wholeness creates perceptual meanings, which are, however, not infinitely proliferating (\oplus_2), due to the essential characteristic of perceptual meaning to unite parts and whole(s). Hence *many become few*.

On the one hand, the meaningful unification of parts and whole(s) does not allow for parts to be isolated while keeping the meaning they obtain and give to the whole in the course of the happening (\ominus_1).²⁷ On the other hand, and apart from isolation, in principle any changes of parts and whole that leave the hierarchy intact are possible and can lead to novel perceptual meanings of a thus variable Gestalt (\ominus_2).²⁸ Instead of applying a priori reasoning or thought experiments, Pinna's research on perceptual meaning makes use of the empirical method of visual proofs and free descriptions of what is visually presented, with all the advantages this particular method and, in general, the inductive-empirical method brings about.²⁹ One of this method's most important research results for the present project is that meaningful Gestalts, i.e. Gestalts that are dynamic due to changes in their parts, are mostly imperfect as measured by *Prägnanz* and principles of grouping: Meaningful Gestalts can be distorted, deformed, internally

²⁴“The form of meaning manifests a strong resistance and adaptability to changes. By introducing variations, changes and happenings the whole meaning tends to be modally invariant. This creates a great stability even to huge disturbances.” [Pinna et al. 2010: 336]

²⁵“[...] ‘happenings’ are not fleeting but are consciously available to the participant for long enough to provide the substrate for a description that is capable of being transmitted verbally to the experimenter.” [Pinna et al. 2009: 248]

²⁶Cf. the end of section 6.4.

²⁷“*Non-decomposability*: The emerging meanings are irreducible. The complex form of meaning cannot be resolved into isolated subcomponents without suffering an irretrievable loss of the meaning. Neglecting any part of the process of meaning assignment or severing any of its connections usually destroys essential aspects of the structure of meanings.” [Pinna 2010: 71]

²⁸“*Hierarchical organization and centralized control*: The complex form of meaning manifests a hierarchical control with a structure similar to a perceptual language, but the power is spread over a decentralized structure that involves all the components. A number of units combine to generate the actual system of meanings, so that the meaning of one component depends on the meanings of the others.” [id.]

²⁹Cf. subsection 1.3.2 and section 6.4.

heterogeneous and distinguished by the absence of parts. Perceptual meaning arises when something that is open to multiple interpretations happens or has happened to a perceptual whole. In order to notice the happening, we not only have to notice the given modal partialness, but value it in its own right, because it determines the amodal whole as it is determined by it. We have to notice and recognize at least the parts that are happening to the whole. Thus what H. Helson [1933: 25] describes as ‘the law of decompositional loss’, according to which the going back to a whole’s parts involves a loss of qualities, whereas only the composition of parts into a whole as a Gestalt “involves the creation of something new”, does not seem to fully apply to Pinna’s more dynamical and bidirectional framework. Probably, K. Bühler’s characterization of an analysis without ‘decompositional loss’ is more appropriate for this framework.³⁰ It also has to be remarked that phenomenological experiments with perceived squares and checkerboards are just methodically useful, simplified and inductively generalizable examples for this interplay of whole and parts through which perceptual meanings are created or noticed in everyday perception.³¹

The final result of this interplay, however, is again unity: not a unity of structural lawfulness, but a unity in which “many elements are reduced to few integrated meanings.” [Pinna 2010: 72] Like in a Hegelian dialectic, one concept (formal wholeness and continuity) is, by way of its negation (partialness and discontinuity), *aufgehoben* into a higher level of itself (meaningful wholeness and continuity). But I think that one has to distinguish more clearly between the process of meaning creation, which consists in the interplay of continuity and discontinuity during and because of the happening, and the created meaning, which is its result: a higher continuity, a more embracing simplicity. There is no doubt that both the process and the result are justified and necessary constituents of everyday empirical perception. There is also no doubt that the result can enter into a new process as soon as the parts and whole undergo more changes or are related to other Gestalts. However, the idea of simplicity as a sort of *causa finalis* of meaning creation somehow mitigates the importance of what goes on in the process of the happening itself. For example, Pinna et al. [2009: 228] write that “[a]s the whole meaning emerges, each component adjusts to it and takes on new perceptual properties derived from and synergistic with that meaning and, *vice versa*, the whole meaning emerges as a result of what is perceived in every single component.” On the one hand, this is a clear formulation of two-sided part-whole dependency, whereby the whole is the higher unity of the form of meaning.

On the other hand, however, it seems that as soon as a more or less stable meaning has been achieved, the discontinuity of the parts, which was the main expression of the happening the structural whole undergoes, ceases and is replaced by an adjustment to the emerged meaningful whole. But if the parts’ contingent lack of adjustment to their ideal structural whole is the condition for the emergence of a meaningful whole, if meaning thus presupposes diversity, then how can this meaningful whole keep itself in existence if it re-adjusts the parts such that no further diversity is perceived? In other words, if the perception of unadjusted parts makes the meaningful whole emerge, but if, at the same time, the emerged meaningful whole turns the

³⁰“Der Eindruck des Komplexen setzt sich tatsächlich aus Komponenten zusammen und darum zerstören wir, wo wir analysierend vorgehen, nicht mit jedem Schritt eine Gestaltqualität, um neue an ihre Stelle zu setzen, sondern wir heben nur bald dies, bald jenes Moment, das in dem Eindruck des verwickelteren Komplexes schon enthalten war oder wenigstens sein konnte, hervor. *Und der erste, noch unanalyzierte Eindruck ist nichts prinzipiell anderes als der spätere, dem diese Analyse zugute gekommen ist.*”

³¹Cf. the interpretation of paintings in Pinna et al. [2009].

perceptibly unadjusted parts into adjusted ones in order to meet the requirement for simplicity, then the question arises whether the result of meaning creation does not, in fact, contradict its own condition for coming into existence. Can perceptual meaning not instead be thought of as keeping the discontinuity of the parts intact such that the meaning itself is ‘kept alive’? This question requires a speculative answer that I cannot give for the moment.³² However, three other points can be provided to develop this question further: Firstly, I would like to elaborate on the intersection between the structural, ideal whole and the discontinuity of its parts, because it is only by the parts becoming discontinuous that a perceptual meaning emerges (section 7.2). Secondly, we need a clarification of the kind of emergence that is going on in the process of the creation of meaningful Gestalts (section 7.3). And thirdly, corresponding to the positive aspect of formulating principles (\oplus_4) and in addition to the already stated determinations PWO_{ded} and $PWO_{ind_lang_1-3}$, I suggest the following principle for the determination of PWO’s ontological nature in the sphere of empirical, meaningful part-whole perception:

$PWO_{ind_emp_1}$: A part-whole oscillation (PWO) is a perceptible process of two-sided part-whole dependency in which both parts and whole become perceptually meaningful through mutual interaction that appears as a happening to the whole via its parts. This dynamic interdependency prevents both absolute whole homogeneity as well as whole primacy and absolute part heterogeneity as well as part primacy.

7.2 Splitting and Merging: J. Koenderink

For a Gestalt to be perceptually meaningful, i.e. to be interpretable as sustaining and manifesting a process of happening, it is necessary both to perceive a homogeneous whole and its heterogeneous parts, particularly if one or more of the latter are deformed or absent. Both sides condition each other. We might say, for example, that for most people a perceptually meaningful house is less a perfectly constructed new building in which every part fulfills a pre-determined aesthetic function for the whole, but rather a house in which the ravages of time have left their traces such that the discontinuous parts tell the story of the whole and vice versa. If we now look for a closer determination of the interface between ‘wholification’ towards homogeneity and ‘partition’ towards heterogeneity, an interface which occurs in the framework of Pinna on three different thresholds (stimulus parts \rightarrow_1 grouping/shaping perceptual whole \rightarrow_2 separated perceptual parts \rightarrow_3 perceptual meaning as unifying perceptual whole and perceptual parts) within one and the same phenomenon, it is helpful to turn to the ideas of another contemporary scholar working in the field of Gestalt theory: J. Koenderink. In fact, it is just one particular idea that Koenderink only sketches briefly, but which I think could nonetheless enhance the understanding of the parts-whole interface for meaningful Gestalts. This is the idea of ‘splitting and merging’.

³²Cf. on this question ‘Dif₆’ in section 7.3 below and a suggestion for answering it by parallelizing part-whole reversals with figure-ground reversals in 7.4.

7.2.1 Visual Awareness and the Multiple-World Hypothesis

These two perceptual processes are embedded in a broader framework that Koenderink has developed in a number of recent publications³³ under the heading of ‘visual awareness’, which is the specification of ‘perceptual awareness’ to the visual domain. The notion of visual awareness is in conformity with Pinna’s experimental-phenomenological method of freely reporting how visual phenomena are perceived as displaying certain qualities and meanings.³⁴ Visual awareness, however, is not only a methodological presupposition, but generally describes the way we see the world when we are aware of the act of seeing. Koenderink argues that in visual awareness, our visual field not only consists of geometrically grouped elements, but is “quality and meaning through and through” [Koenderink et al. 2015b: 78]³⁵ To this extent, visual awareness happens prior to any cognitive involvement that could abstract from the directly perceived qualities and meanings, or unmask a percept as mere illusion,³⁶ or even establish an ontological gap between the percept (as not-self) and the perceiver (as self). It also happens before and independent of our physical knowledge about the world.³⁷ In being pure seeing without judgment and critical reflection, visual awareness also does not depend on an act of volition; it just happens to you.³⁸ “That is why awareness is most aptly described as presentation (*Vorstellung*), rather than as representation as the mainstream would have it. Because awareness cannot be controlled mentally, it is pre-personal, and pre- (or perhaps proto-)rational. It is more correct to say ‘there is awareness’ than to say ‘I have awareness.’” [Koenderink 2012b: 4] Furthermore, Koenderink defines Gestalts as the objects of visual awareness.³⁹ This implies that Gestalts are imperceptible if one does not sense their qualities and perceptual meanings as well. In accordance with Pinna, he determines the meaning of a Gestalt as a happening.⁴⁰ In particular, in the case of pictorial objects of a painting, but also in our everyday visual awareness, Gestalts “come with a past and a future [...]. Time appears as a context in which the objects are embedded. Although presentations are only the ‘moment now,’ they are apparently enveloped in time. This temporality is an important, even defining quality of every

³³Cf. Koenderink [2011; 2012b; 2012a; 2013; 2014; 2015a; 2015c; 2015d; 2015a] and Koenderink et al. [2015b; 2015b; 2016].

³⁴Cf. Koenderink [2015a: 53].

³⁵“The contents of awareness is characterized by quality and sense. Here I use ‘sense’ as in ‘good horse sense’. Sense is not ‘meaning’ as in thought, sense is different from meaning in the logical sense. Meaning is part of thought, and thought is something you do. Thought implies the self. Thought can be true of false, good or evil, and so forth, whereas awareness is beyond such dichotomies. It simply is.” [Koenderink 2012b: 4]

³⁶“Your awareness is your *reality* in the sense that it is simply given to you. Introspectively, a ‘corrected illusion’ in reflective thought is much ‘less real’ than the illusion in your immediate visual awareness. Thoughts may be right or wrong (your *rational mind* knows that), but awareness is *beyond* this or that, right or wrong (your *gut feelings* depend on that).” [Koenderink 2015d: 103]

³⁷Cf. Koenderink [2015d: 1047].

³⁸“The first thing to notice is that awareness *happens to you*. There is nothing you can do about it. Awareness comes like a sneeze. If you want to get rid of visual awareness of the scene in front of you, all you can do is close your eyes, or turn your head. Merely willing the awareness to go away has no effect.” [Koenderink 2012b: 3]

³⁹I use *Gestalt* as synonymous with ‘object of visual awareness’. I could as well have focussed on the auditory or haptic modalities. Gestalts come in great variety. Their common nature is that they withdraw from analysis, that ‘nothing can be changed’. Phenomenologically they are created and annihilated instantaneously. Some are short-lived ‘glimpses’, others seem ‘immutable.’ [Koenderink 2015a: 131]

⁴⁰“Gestalts are not necessarily of a *static* nature, typically they are *happenings*. [...] Happenings account for the bulk of your experience.” [id.: 132]

pictorial object.” [Koenderink 2001: 302] It is in the course of this temporality of a meaningful happening in visual awareness in which the acts of ‘splitting and merging’ occur.

Let us first have a look at the underlying ontological hypothesis that conditions these acts. The hypothesis is called the ‘multiple-world hypothesis’ and it states that what we perceive as reality in our visual awareness is mostly and fundamentally ambiguous, even if we don’t notice it. There is not one definite and veridical way in which we perceive something correctly, as it ‘really’ is. This not only presupposes – following the tradition of Gestalt theory – that there is no constancy between stimulus and percept such that “sensation is a direct and definite function of the stimulus” [Koffka 1922: 534];⁴¹ in Koenderink’s [2001: 5] words, “it is entirely possible to have different perceptions in the face of the same optical structure (stimulus). This is due to the fact that perceptions invariably contain a considerable ‘beholder’s share’. The beholder’s share derives from the observer’s visual expertise and prior knowledge.” To this we can also add the observer’s physiological constitution, expectations, assumptions, emotions, sociocultural background, etc. We thus often perceive and interpret the same object, which does not have to be a material thing, in a contingent manner, as one of many equally possible and plausible Gestalts, depending on usually unreflected subjective reasons.

In addition to this refusal of the constancy hypothesis, Koenderink also claims that every alternative Gestalt that corresponds in its own way to a given set of stimuli is a possible world, i.e. a possible visual world in the case of visual Gestalts. It is as if, prior to any perception, we find ourselves arriving from a road that suddenly splits up into two or more equally possible continuations of which we have to choose one to continue in a way that makes the most sense to us. We thus make an often unnoticeable decision to see something *as* something and thereby we choose one possible world over others. Before this decision, “my percept was undefined (multiple visual worlds); after my decision, it became history, part of my mental makeup. The multiple worlds collapsed into a single one at the moment of the decision-in-action. The percept became operationally defined. In real life the decisions-in-action occur at moments that are *forced upon me by the world*; there is typically no looking back. It is *the flow of time*. [...] Decisions-in-action *happen* to you. The multiple visual worlds continually collapse. No doubt this is the reason why your percepts tend to be well defined most of the time.” [id.]

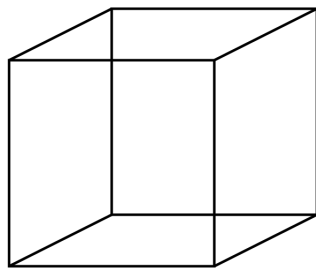


Figure 7-2: *Necker Cube*

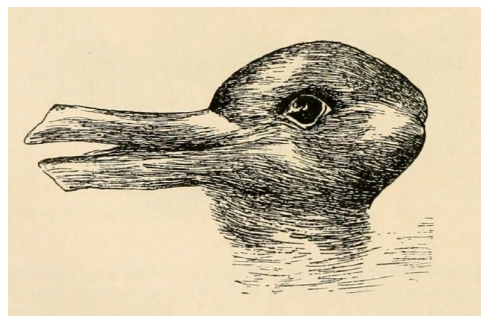


Figure 7-3: *Duck-Rabbit*

However, while most of the time our percepts indeed appear to be stable despite their underlying ambiguity⁴² and due to the needs and advantages of making immediate decisions, in some cases the ambiguity prevails in such a manner that every ‘decision-in-action’ leads us back to the

⁴¹This is the so-called ‘constancy-hypothesis’ that Gestalt theorists have refused; cf. subsection 6.3.1.

⁴²Cf. section 7.4 on ambiguity in perception.

state prior to the decision. This is particularly the case when we are not forced to make a decision, for example in the contemplation of artworks in which there is a broad scope of interpretability. Another striking example in which visual interpretations stand side-by-side instead of being reduced to only one are illusions of reversing figures, such as the well-known Necker cube (Figure 7-2⁴³). We have two options here of seeing this cube 3-dimensionally, and once we (mostly automatically) decide for one option, i.e. one ‘visual world’, the other one does not collapse, but is still retrievable. Here, as in the duck-rabbit illusion (Figure 7-3⁴⁴) and in all ‘pictorial worlds’ of artworks,⁴⁵ the fact that “you entertain multiple possibilities can be shown operationally when you let the picture develop over time in a movie-like fashion. There will be different degrees of surprise for various developments. You will buy many different movie shreds as ‘natural’, thus revealing the indefiniteness of the initial percept. The problem occurs in real life. It is not just fancy theory or mere philosophising.” [id.: 6–7] To this extent, visual awareness comprises the ability of sensing the internal ambiguity of an object, of perceiving and acknowledging the diversity of visual worlds and letting them ‘fluctuate’⁴⁶ instead of reducing this diversity by judging and deciding for one of them in order to proceed on our respective course of action. In becoming aware of this ambiguity, we become aware of the ontological fact that any “Gestalt can give way to something else at the drop of a hat. Literally! A snap of the fingers or a heartbeat might do the same. Any Gestalt is *mysterious* in the sense that one may never exhaust *what else* it might be [...]” [Koenderink 2015a: 134]

This means that often we (have to⁴⁷) take our time and employ our imagination during the state of visual awareness instead of accepting the first clear-cut viewpoint of a Gestalt as the definite and most appropriate one. Only on the second glance are we able to discover several sides of an object that are equally stable⁴⁸ and contribute to the object’s perceptible meanings by opening up more than one of the possible visual worlds in which it appears to us. In fact, Koenderink argues that this opening-up of a visual Gestalt’s parallel worlds happens thanks to a process called ‘microgenesis’⁴⁹, which is “a hypothetical subconscious process that continually comes up with visual presentations. It is a systolic process, a single systole taking less than a

⁴³Reproduced from Necker [1832: 336].

⁴⁴Reproduced from Jastrow [1899: 312].

⁴⁵Cf. Koenderink [2011].

⁴⁶“The duck-rabbit example is important in my arguments for two reasons. It shows that ‘pictorial worlds’ are *parallel worlds*, in the sense that only one instance is in immediate visual awareness, although this may vary from one presentation to another. On the ontic level where duck and rabbit live, they never meet. It also shows that awareness fluctuates between parallel worlds. Here the temporality is less important than the multifariousness.” [Koenderink 2013: 9]

⁴⁷According to Koenderink [2001: 3], often we recognize the ambiguity of a visual object only when we are explicitly confronted with this ambiguity such that we have to decide for one of several visual worlds: “I think that in a great many cases perceptions are more of the multiple-visual-worlds variety than like the single guess. You don’t notice this in the laboratory, because most psychophysical methods *force a unique response*. They simulate the decisions-in-action of daily life. That you don’t notice the essential ambiguity of perception in real life is likely due to the fact that you don’t need to take decisions on issues on which no actions would be taken anyway. That the multiple-visual-worlds option is indeed likely is suggested by the fact that a change of psychophysical method or task often leads to distinctly different results. This is not to say that observers actually entertain multiple-visual-worlds interpretations explicitly, but merely that they don’t necessarily resolve ambiguities when this is not specifically required for some action or decision.”

⁴⁸Cf. section 7.4 on the notion of ‘multistability’ in the context of perceptible figure-ground reversals.

⁴⁹In Koenderink [2011], he alternatively uses the term ‘iconogenesis’ and in Koenderink et al. [2015b], he prefers ‘psychogenesis’.

tenth of a second.” [Koenderink 2012b: 11] Thus the presentations of even one and the same object of visual awareness “follow each other at a rate of about a dozen a second. [...] Typically each one is similar to the immediately preceding one, though occasionally sudden changes occur.” [Koenderink 2015d: 1046] Such changes in the perception of a Gestalt can occur and be observed in visual awareness. Due to the rapidity of microgenesis’ systolic sequencing of visual presentations, however, a more stable object of visual awareness is normally a – still precognitive – fixation of a few single visual presentations. These fixations are called ‘glances’,⁵⁰ while a number of glances combined can result in a ‘good look’⁵¹ that already has a cognitive dimension and “may last from one to maybe a dozen of seconds.” [Koenderink 2012b: 12]. Furthermore, a few ‘good looks’ enables the disposition of ‘scrutiny’, which is a “mixture of cognitive integration and visual awareness.” [id.]

In my understanding, the conscious and unconscious acts of *splitting* a whole into its dependent parts or sub-wholes and *merging* dependent parts or sub-wholes into a more comprehensive whole can take place on all of these levels of precognitive and cognitive visual awareness. It is in these acts where “the mereological structure of a picture changes from presentation to presentation, even for a single observer.” [Koenderink 2013: 14] In so doing, additional visual worlds emerge in which novel perceptual meanings of a Gestalt become palpable, since “[v]irtually all of the Gestalts making up the mereological structure are ephemeral. The whole structure fluctuates as the systolic process of iconogenesis [i.e. microgenesis, M.S.] pumps out its presentations.” [Koenderink 2011: 316] Instead of drawing on simple figures of lines and dots which can easily be applied in laboratory experiments and exhaustively perceived in a couple of seconds, Koenderink prefers to use visual works of art to demonstrate, among others, the acts of splitting and merging.⁵²

Among the artistic examples he employs to illustrate how splitting and merging works in visual awareness as essential acts of any experimental phenomenology,⁵³ he refers to S. Dalí’s 1938 painting ‘Apparition of Face and Fruit Dish on a Beach’⁵⁴ Like most objects of visual awareness, this painting both consists of natural and artificial parts.⁵⁵ Whereas artificial parts correspond to the concept of a piece as an independent part and in so doing concern the material

⁵⁰Cf. Koenderink [2012b: 12]. In Koenderink et al. [2015b: 78], he states the following on ‘glances’: “Even in slightly complicated configurations one often notices sequences of different presentations. Each single glimpse yields a certain well defined visual awareness, but continued looking, even a good look of a few seconds, may well reveal a number of qualitatively different awarenesses. It is likely that psychogenesis [i.e. microgenesis, M.S.] comes up with numerous ways to account for the optical structure incident upon the retina, and that now this, now that hallucination ‘wins’, and determines the presentation in awareness.”

⁵¹Cf. id.

⁵²“In the case of paintings any single presentation only yields part of an articulated (the process never really ends) nexus of Gestalts. This is somewhat different from the conventional examples presented in the literature of experimental psychology. Such examples have such a limited complexity that they can often be exhausted in just a few, or even a single, presentation, certainly in a specious present. Most paintings are far too highly structured for that. The casual visitor of a museum may grant a painting only a cursory glance, but the connoisseur knows it takes time, often an appreciable amount, to get to know a work. Moreover, the best paintings appear to be inexhaustible, and reward repeated viewing.” [Koenderink 2011: 317]

⁵³Cf. id. [16].

⁵⁴Oil on canvas, 114.8 cm × 143.8 cm, Wadsworth Atheneum, Hartford, Connecticut. For copyright reasons, I cannot reproduce this painting here, but have to refer to https://en.wikipedia.org/wiki/Apparition_of_Face_and_Fruit_Dish_on_a_Beach (last visited on 7 December 2019) instead.

⁵⁵Cf. id. [14].

composition of the artwork, natural parts are the discernible yet inseparable semantic contents. A splitting of the painting into artificial parts would mean, for example, cutting it into pieces in order to produce a jigsaw puzzle. The arbitrariness of the shape and number of such pieces is contrasted with the intrinsic order and visually meaningful relations the natural parts display. Many of the natural parts of Dalí's painting catch our eye at first glance, while some demand a closer look to be detected. One of the first natural parts we may become aware of is the face in the middle of the painting. But not only is it impossible to separate this face from the painting due to its missing borders with the surrounding elements (which shows that artificial parts and natural parts do not have to be identical), but also, on closer inspection the observer might discover that the face actually is a whole in the sense of a merging of other natural parts: the hairs are pears, the forehead is sand, the merger of the forehead and the nose is a goblet, the right eye is a vase, the left eye is a hardly recognizable lying object (maybe a sleeping or dead human?), and the chin could be a large shell. In looking at and interpreting this face, we in fact constantly merge its constituent parts into a more comprehensive whole and we split the whole into natural parts. There are multiple worlds, multiple possibilities and multiple perceptual stabilities involving the face, its natural parts and the regions external to the face, since every element in the painting can be more or less meaningfully related to it. The creation of visual meaning presupposes this bi-directional process, in other words: this *oscillation* of splitting and merging.

The same is true for all of the other objects of visual awareness in this artwork as well: "Keep looking for a while. The semantic transitions you are likely to experience are remarkable. Since it was painted by a man, the contents are only finite. Yet, you may feel uncertain to have exhausted the contents, even after a considerable period of scrutiny." [Koenderink 2013: 17] In order to conceive visual meanings, every possible viewpoint involves acts of splitting and merging. Furthermore, every natural part that is split off and every whole that is a merger entails, according to Koenderink, its own visual world that exists parallel to the other visual worlds of the artwork and – once detected – always remains retrievable due to the multistability of perception. "Prolonged viewing will suggest different part-whole relations. They do not necessarily start from nameable parts, often 'recognition' occurs *after* the Gestalt formation. The splits and merges largely occur on a level just above the rockbottom marks. Yet they lead to transitions from one parallel world to another at the highest level. 'Wholes' and 'parts' interact." [id.: 16] Although the highly surreal and dreamlike content of Dalí's painting may suggest otherwise, in our everyday perception of the world(s) around us we also incessantly split and merge, i.e. 'zoom in' and 'zoom out',⁵⁶ of what is empirically presented and present to us. This can happen consciously, e.g. when we are looking for a book on a cramped bookshelf or for a person in a crowd of people, or unconsciously, e.g. when we drive a car and we merge the street, the traffic and the signs into one single whole or when we split the street at a crossroad and take one direction and thus decide for one possible (not only visual) world. One of the unique features of Dalí's painting, however, is to expatiate upon this continuous process and to imbue it with a plenitude of concentrated visual meanings in the framework of artistic brilliance.

⁵⁶Cf. Koenderink [2011: 318].

7.2.2 Complicacies in Pinpointing the Acts of Splitting and Merging

Whereas the perception and interpretation of artworks and thus empirical aesthetics in the broadest sense may serve as eligible illustrations of splitting and merging, it is problematic to explain such acts by means of traditional approaches. At least in my own reading of Koenderink's rather brief reflections on this topic, he argues that neither the distinction between figure and ground that is so prominent even in contemporary Gestalt theory, nor classical extensional mereology, nor any theory that strives for an exact determination of the number and nature of atomic parts and/or a not further mergeable whole in a particular object of perception can do justice to the phenomenon of splitting and merging. Firstly, the figure-ground distinction, about which I will provide more information in section 7.4 below, is ill-suited because it denies any object-status to what is considered as ground. Compared to a figure, the ground on which it appears has – according to Rubin – no form,⁵⁷ no poignancy [*Eindringlichkeit*]⁵⁸ and almost no visual meaning,⁵⁹ which is why it therefore leaves us aesthetically indifferent.⁶⁰ It is true that if we split off a natural part (np_1) from the surrounding ones ($np_{2...n}$) in order to 'zoom in' on it to derive meaning out of its singularity, then $np_{2...n}$ and the merges np_1 may have formed with $np_{2...n}$ are faded out. In contrast to the classical definition of a ground, however, what is faded out still remains an object of visual awareness and is potentially retrievable – presuming the hypothesis of 'microgenesis' – in the next deciseconds.⁶¹ Beyond Koenderink's own scarce yet insightful reflections on this subject matter, we could even say that there is and has to be a productive tension between what is present and what is latent in order to generate visual meaning and to account for the creative nature of the visual system.⁶² The same problem for the application of the figure-ground structure holds true, as we have seen, for conceptual metonymy, in which the source domain, which can be either part or whole, remains a latent target since the mapping from source to target is, by definition, reversible.⁶³ This is why I think that there are important structural similarities between conceptual metonymy and two-sided part-whole dependence, in particular as instantiated by the acts of perceptual splitting and merging, such that the latter may serve as the experiential domain for the development of the former and its expression in ordinary language.

Secondly, the co-activation of source and target, i.e. of remainder and what is split off/merged, prevents the sufficiency of a simple mereological definition of "*proper parthood* of an object with respect to a whole such that the whole should at least contain another part, not overlapping, with the object to split off. Thus any 'proper part' is 'supplemented' by another, *disjoint* part. That other part then is the 'remainder'. Most people would agree to add this to the axioms of ground mereology, promoting it to *minimal mereology*." [id.: 16] While this approach of

⁵⁷Cf. Rubin [1921: 36].

⁵⁸Cf. id. [67].

⁵⁹Cf. id. [74].

⁶⁰Cf. id. [77].

⁶¹"Splitting an object intuitively yields two additional objects, namely the object that was 'split off', and a 'remainder'. Of course, there are numerous problems with such an idea. For instance, can you be certain that a 'remainder' exists? The 'ground' in a figure-ground split is not an object. [...] The intuition is that splitting an object only makes sense if there is a remainder. But then, the figure-ground split doesn't split an object, because the remainder (the background) is not a proper object of visual awareness." [Koenderink 2013: 16]

⁶²Cf. Koenderink et al. [2015b: 78].

⁶³Cf. subsection 5.3.2. and the determination $PWO_{ind_lang_2}$.

classical extensional mereology would indeed work for wholes that are decomposable into material pieces due to the disjointedness and artificial decomposability of the latter,⁶⁴ a work of art like Dalí's painting demonstrates that there are overlapping yet distinguishable strata of meaning in which one and the same natural part can be involved. For example, if we split off and concentrate on one natural part, let's say the right eye of the face in the center, such that the object of our visual awareness turns into a vase (target) and leaves behind its role of being a right eye (source), then the remainder (the face) still includes the right eye. Although the observer now sees and interprets the natural part in question as a vase, they still see or at least know it to be a right eye as well. Thus, by partaking in several pictorial worlds, one and the same natural part can be part of itself, because it can be included in its own remainder, which contradicts the mereological axiom of proper parthood in the sense of disjointedness ($x < y$ if x is a part of a whole y and $x \neq y$).

Then there is, thirdly, a set of issues that makes the acts of splitting and merging incompatible with any theory postulating either the existence of atomic, i.e. indivisible parts that would delimit the act of splitting, and/or the existence of an absolute whole that is not further mergeable into a more comprehensive whole. Concerning the micro-level of atomic parts, Koenderink asks, "Is there an end to splitting? Are there rockbottom 'atomic' objects'?" [id.: 16] Instead of denying the existence of atomic parts in principle, however, he reacts to this question by making a rough distinction between what could be called the 'technical' parts of a visual object and its 'density'. The technical parts, on the one hand, are identifiable on the atomic scale with the visible strokes of the brush,⁶⁵ with continuous planes of color,⁶⁶ or the array of pixels of digital artworks.⁶⁷ In a technical sense, such atomic parts have to be understood as the basic entities of a visual object. In our visual awareness, on the other hand, such atomic parts only play a minor role. "In painting, the individual touches might be considered atomic, at least if they were intended to be visually apparent. An alternative would be to say that there are no atoms, but a [...] *density*, 'density' implying that any part has a proper part. This implies a continuum of parts. The structure defined by the regular open sets of the Euclidean plane with set inclusion as parthood relation is the model. One has a choice here, the blue sky [in Margritte's *Le Seize Septembre*, M.S.] as an atom fits the description of distribution of pigments accurately, but the density interpretation appears to capture the affective tone of a 'deep' blue sky." [id.: 17–8]. The notion of density implies that the act of splitting is theoretically endless, that every further split cuts deeper into the density of the visual object, but only up to the point where the continuation of this act becomes devoid of meaning, because sooner or later it will become impossible to detect any visual meaning the Gestalt may display. Splitting without simultaneous merging ultimately leads to pointlessness – and vice versa. This is not only the case for visual art, of course, but more generally for everyday empirical perception: As long as there is at least a felt potentiality of perceptual meaning, the act of splitting itself makes sense and can be continued in order to analyze parts that seem to be natural units to the observer.

Likewise regarding the macro-scale in merging, we can ask in a similar fashion: "How many

⁶⁴Cf. section 3.1.

⁶⁵Here we can think of impressionist and pointillist paintings.

⁶⁶As examples, Koenderink [id.: 17] refers to K. Malevich's *Black Square* (1915) and the blue sky in R. Margritte's *Le Seize Septembre* (1956).

⁶⁷Here Koenderink uses the example of the face of R. Lichtenstein's *Girl in mirror* (1964), but we can also think of animated digital art such as films or video games.

objects will you arrive at when you continue the process indiscriminately? Is there an end to merging, a ‘universe’ that contains everything? In the visual arts that would be the ‘gist’, but is it unique?” [id.: 16] Similarly to the opposite direction of splitting, Koenderink demonstrates that in the act of merging there is a difference between a technical and a phenomenological sense. Technically, we can indeed merge two or more natural parts to arrive at a merge that is clearly separated from its background and that absorbs its parts in such a way that no further merges (and splits) are possible. “In the simplest case one might do a ‘blur’ and ‘posterize’ to force a ‘sum’, but the ‘eye measure sum’ is different.” [id.] Whereas Koenderink shows this on the basis of P. del Vaga’s painting *Madonna col Bambino* (ca. 1535) and by using *Adobe Photoshop*⁶⁸, we can receive the same results by applying this technical approach to a desaturated cutout of Dalí’s painting in which the elements of the face are blurred, merged and thereby segmented “based upon the raw pixel values” [id. 16] If we only look at this artificially highlighted figure and define it as the complete visual domain at hand, then indeed we have arrived at a visual object for which further acts of splitting and merging would be futile. What is visible instead is a fusion of now indistinguishable parts that almost – were it not for the open borders of the jaw that makes us amodally complete the Gestalt of the face even in the modified version – appears like a ‘monad’ without relations to the indecipherable world around it. While the face (the whole) is still visible, both its own parts and the surrounding parts with which it could merge have become indistinguishable and therefore not further relatable to the merger that is the face. As a result, no more split or merged elements can emerge. With the measure of our eyes and the visual interpretations that go along with it, however, such a technical and absolute merge is not only unascertainable, but would also be fruitless, because it would put an end to the creative meaning-generating fluctuation of splitting a visual object into parts and merging it into (sub-)wholes in order to let us move along and exceed the thresholds of parallel visual worlds. Any unanalyzable minimum on the micro-level or any unsynthesizable maximum on the macro-level would perhaps constitute a hierarchic taxonomy of parts and whole, but such a static and determined taxonomy in a technical perspective is foreign to the processes inherent to our visual awareness. Indeed, a perceptual world “is like a taxonomic tree, but it is a *dynamic* taxonomy. Wholes are not determined, but exist as potential sources of parts. Parts are not determined either, they only have a floating existence. The whole may change and make the part irrelevant, or a part may take on the role of a whole.” [id.: 23] Any theory that postulates absolute limits downwards or upwards and in so doing (pre)determines the part-whole taxonomy is therefore insufficient to describe the phenomenon of splitting and merging. The question remains, however, of what a positive theory might look like, how it can be empirically justified given the high subjectivity involved in the acts just delineated, and which ontological commitments it has to make given the sheer infinite proliferation of entities that come into being in the course of such acts.

If we now turn, with this last question in the back of our minds, to a brief evaluation of Koenderink’s ideas on splitting and merging for the present purpose of determining the ontological nature of PWO, then an ambivalent conclusion has to be given. On the one hand, the ontological nature of splitting and merging a Gestalt perfectly accounts for the two-sided dependency of parts and wholes that the notion of PWO implies from the outset. Splitting and merging, i.e. ‘zooming-in’ and ‘zooming-out’, is a bidirectional movement through which

⁶⁸Cf. id. [16].

a whole only receives perceptual meaning via an awareness of its natural, dependent parts and vice versa in a fluctuating and often creative way. The method of experimental phenomenology and in particular the use of artworks, e.g. Dali's 'Apparition of Face and Fruit Dish on a Beach', as objects of visual awareness on which these acts can be studied shows that if we want to understand reality as structured in dynamic relations of parts and wholes, then we are well advised to adopt splitting and merging into the determination of PWO's ontological nature and therefore include it in its definition.

On the other hand, Koenderink – standing in the tradition of Gestalt theory's critical realism⁶⁹ – repeatedly emphasizes that splitting and merging are nothing but subjective acts such that the perceptual meanings and multiple visual worlds involved in these acts only exist in our minds. "Sense, nor quality are in nature, they are in the mind. You can't 'pick up' sense and quality, you have to supply it!" [Koenderink 2012b: 12] It is impossible that or at least unknowable whether reality itself, be it physical reality or any other aspect of it that might exist either independent of our mind or interdependent with it, possesses this dynamic and reversible taxonomy of parts and wholes that is essential to splitting and merging. Rather than the possibility that *because* the ontological nature of reality *enables* such a taxonomy and our perception of it to make splitting and merging possible at all, Koenderink sees it the other way round: Only *because of* such acts of our visual awareness are we able to interpret the phenomenal side of reality as consisting of, among others, interdependent part-whole relations. Koenderink suggests a Kantian stance in this regard: "If you really must, then adopt Kant's notion of the 'Ding an sich': you will forever be unable to reach the 'real' thing! It seems more practical to adopt the attitude that reality is what you experience. Of course, the experience reflects the way you are, just as it reflects the way the 'world' is. But this makes sense, simply consider the way a traffic sign pole is to you, your dog, or a pigeon. Who has it right? Why?" [id.: 7].

To me it seems, however, that a *reflection* of how the world is means here just another, perhaps more euphemistic word for a more or less corresponding mental *representation* of it. This, however, contradicts the insistence that the object of visual awareness is supposed to be a precognitive, direct *presentation* rather than a mediated *representation*.⁷⁰ The representative character of perceptual objects is even enforced by Koenderink's affirmation of D. Hoffmann's metaphor for the perceptual system as a 'user interface'⁷¹ through which every mind accesses the world outside of it in an evolutionary practical and ideally non-veridical manner. Like the icons on a virtual desktop, the perceptual object in front of us "is like the Gestalt, quality, or meaning, in your visual awareness. Although the elements of your visual awareness are not physical objects, they are indeed your reality. But they are *your* reality, and nothing

⁶⁹Cf. Bischof [1966: 27–30], Hüppe [1984: 2] and for an elaborated system of several 'levels of reality' Metzger [2001].

⁷⁰Cf. Koenderink 2012b: 4.

⁷¹A recent explication of this metaphor by Hoffmann [2016: 158] reads as follows: "The perceptual systems with which we have been endowed by natural selection are a species-specific interface that allows us to interact adaptively and successfully with objective reality, while remaining blissfully ignorant of the complexity of that objective reality. Space-time is the desktop of our perceptual interface, and physical objects are icons on that desktop. To ask whether the red color and round shape that I perceive of an apple on the table are the veridical color and shape of something in objective reality is the same category mistake as asking if the red color and rectangular shape of the icon for the PowerPoint presentation are the veridical color and shape of something in the computer."

beyond that.” [Koenderink 2015d: 1058] In the spirit of Kant, such a user interface is a priorily determined and difficult, if not impossible, to modify due to the biological state into which our brain has developed in the course of evolution.⁷²

Despite this dominant subjectivism that would even open the door to a complete idealism, were it not for the assumption that the process of microgenesis constantly conducts ‘reality-checks’ in order to recognize and avoid hallucinations,⁷³ Koenderink allows for a certain amount of intersubjectivity that then becomes a ‘shared objectivity’ over time.⁷⁴ However, for a sufficient and comprehensive determination of the ontological status of PWO along the lines of – among other things – the parameter *reality*, a complete reduction of meaningful Gestalts with two-sided dependency of parts and whole to the perceptual system is insufficient. Due to the undeniability of our embodied being-in-the-world,⁷⁵ we cannot and should not assume a strict ontological gap between subject/perception and world/reality. As the world exists and has existed prior to the evolution of mind and brain,⁷⁶ processes of the latter must be somehow detectable in the ontological structure of the former – or, at least, this possibility should not be ruled out by merely taking for granted that qualities and meanings and the processes which lead to them only exist in the mind and/or brain. So maybe the acts of splitting and merging are only the (inter-)subjective ramification of the more reality-based and therefore general process of what I call, for lack of a better term, PWO? This less ‘critical’ yet more ‘realist’ perspective should at least be taken into consideration⁷⁷, which is why as a next step in the determination of PWO’s ontological nature, we have to look at it as a dynamic process that might have its origins not in psychological reality, but in emergent processes already detectable in physical reality. Nonetheless, with Koenderink’s observations on ‘splitting’ and ‘merging’ as belonging to our ‘visual awareness’, it is now possible to formulate the second determination of PWO’s ontological nature in the realm of empirical perception:

PWO_{ind_emp_2}: A part-whole oscillation (PWO) is a perceptible process of two-sided part-whole dependency in which both parts and whole become perceptually meaningful through mutual interaction that is instantiated by the acts of splitting a whole into parts and merging parts into a whole.

7.3 Part-Whole Emergence

Additional to perceptual meaning as happening (Pinna) and the acts of splitting-merging (Koenderink), there is a further notion that is integrable into the ontological determination of two-sided part-whole dependency: the concept of emergence. Unlike the previous two aspects, however, emergence has been consequential for Gestalt theory since its very beginnings, because the coming into existence of a Gestalt is unthinkable without any weaker or stronger

⁷²Cf. Koenderink [2015d: 1060].

⁷³“Psychogenesis [i.e. microgenesis, M.S.] starts as a mere ‘hallucination’, and gains existential power when it completes ‘reality checks’ in the visual front end.” [Koenderink et al. 2015b: 72]

⁷⁴Cf. Koenderink [2015a: 46].

⁷⁵Cf. subsection 4.1.2.

⁷⁶Cf. the first chapter in Meillassoux [2008] on this argument of ‘ancestrality’.

⁷⁷For such a perspective, cf. the insightful discussion of formal-ontological divisions of sets and conglomerations in the context of realities structured in different levels in Asenjo [?].

postulation of creativity and novelty. Moreover, whereas Pinna and Koenderink explicitly understand perceptual meanings as belonging to the cognitive side of the perceiving subject,⁷⁸ which is in line with current neurological research, the concept of emergence allows for a more universal perspective on reality and part-whole structures. This is because emergence is not only researched on in empirical perception and Gestalt theory, but is also related to processes e.g. in physics, biology, chemistry, sociology, theology or just ordinary language.⁷⁹ Emergence is thus, prior to its respective applications and definitions, an ontologically neutral concept with which one can describe or perhaps even explain the coming into existence of novel features and entities in various ontological regions studied by various scientific disciplines.

A sufficient definition of emergent properties can hence simply refer, without any further ontological commitments and specifications, to ‘self-organizing processes’ in general: “Self-organizing processes may give rise to new, unexpected properties and behaviors in living systems, also called *emergent properties*. Emergent properties can be defined as properties that are possessed by a dynamical system as a whole but not by its constituent parts. To put it another way, emergent phenomena are phenomena that are expressed at higher levels of organization in the system but not at the lower levels.” [Boi 2017: 182] If we were to succeed in relating emergence in some way to part-whole interdependency without reducing it completely to cognitive processes but by leaving it on the more comprehensive level of a ‘self-organizing system’, then it would be possible to determine the ontological nature of PWO as a more reality-based and universal process. This, in turn, would facilitate the integration of PWO into a theoretical framework that is concerned with the fundamental and experienceable nature of reality itself and not only of reality-perceiving subjects. Furthermore, an elucidation of the concept of emergence would also improve the understanding of perceptual meaning itself, since both Pinna and Koenderink describe perceptual meaning as being somehow emergent,⁸⁰ without, however, providing or referring to a concrete theory of what emergence entails in their view.

In recent years, there has been an increasing amount of interdisciplinary literature on the concept of emergence. In other words, we are witnessing a “re-emergence of emergence theories in contemporary thought.” [Clayton 2006: 27] Similarly to the philosophical reflections on Gestalt theory, the overarching question in this literature is whether a whole is simply a summative aggregate of its parts, or something additional to and caused by its parts yet reducible to them, or something that might be caused by its parts but in turn influences and sustains its parts in such a way that it is irreducible to them. Parts are then usually understood as atomic physical entities with inherent properties, over and above which non-physical entities

⁷⁸Pinna et al. [2009: 228]: “One of the uniquenesses of the human brain is the perceptual capability to perceive complex meanings through very simple and abstract elements. This capability depends on a spontaneous organizing tendency of the human brain that creates orders and meanings at many perceptual levels.” As to Koenderink, cf. the previous two paragraphs. This viewpoint is in line with current neurological research on Gestalt formation, for example with the fMRI study of Kubilius et al. [2011] that comes to the conclusion that “superadditive global shapes emerge at higher-level visual areas” [id.: 1301] in the brain.

⁷⁹Cf. Goetz [1964] and Robinson [2009: 528] for an overview.

⁸⁰“The perceived meanings are not present in any of the individual subcomponents taken alone, but emerge from component interactions [...]” Pinna [2010: 71] Although Koenderink is less explicit about this topic, he states that “[t]here are no meanings (in the sense of ‘sense’) or qualities (like the ‘redness’ of a rose) in physics [...]. The whole idea that visual awareness might ‘represent’ something like a description in terms of physics is nonsensical. Visual awareness is presentation, presentations are visual reality.” [Koenderink 2012b: 6] This statement comes very close to the general conviction of emergentists that not all properties and entities are ultimately reducible to a supposedly physical world of smallest particles.

or properties with causal powers on their foundation might or might not emerge. Thus contrary to reductionist theories that defend one or another form of what Kim calls ‘mereological supervenience’,⁸¹ “[e]mergence theories presuppose that the once-popular project of complete explanatory reduction – that is, explaining all phenomena in the natural world in terms of the objects and laws of physics – is finally impossible.” [id.: 1]

There can be all kinds of emergent phenomena: consciousness, concepts, the soul, social groups, tertiary qualities and qualia, religious symbols, moral values, artistic qualities, biological symbioses and chemical reactions, perceptual Gestalts – to name just a few candidates.⁸² Although the respective discussions of emergence are often highly specialized and formalized, a more general review of this literature reveals three central and recurrent themes that are also relevant for a more specific take on emergence in the context of Gestalt theory: (1) the distinction between epistemological and ontological emergence, (2) the supposition of a hierarchy of levels that usually goes along with an approval of ontological emergence, and (3) the presumption of ‘downward causation’ that equally presupposes the existence of emergence qualities or entities. Let me sketch each of these themes before suggesting a more specific theory on emergence that could be useful for an understanding of perceptually meaningful Gestalts in terms of part-whole interdependency.

7.3.1 Ontological Emergence, Hierarchies and Downward Causation

(1) Probably the major distinction in the recent literature on emergence is the one between epistemological and ontological emergence. The former is also called ‘weak’ and the latter ‘strong’ emergence. This distinction comprises the one between reductionism and emergentism, since even a reductionist, for whom all hypothetically emergent wholes are ultimately reducible to physical parts, might accept a version of epistemological emergence without contradiction, while a genuine emergentist would only embrace ontological emergence. This is because the stance of epistemological emergence indicates, according to Silberstein et al. [1999: 186], that a “property of an object or system is epistemologically emergent if the property is reducible to or determined by the intrinsic properties of the ultimate constituents of the object or system, while at the same time it is very difficult for us to explain, predict or derive the property on the basis of the ultimate constituents. Epistemologically emergent properties are novel only at a level of description.” Saying that ‘my laptop is broken’, for example, would be just a more practical way of communicating a certain problem for which the real physical cause (maybe the screen, maybe the hard disk) is either unknown or too specific to explain in the given context. This does not change the fact that the material laptop is nothing above and beyond an (ideally functioning) aggregate of its physical parts. Describing this aggregate as ‘broken’ is only an epistemologically, i.e. not *real* emergent property. The benefits of embracing a view of weak emergence are, among others, that it is “metaphysically innocent, consistent with materialism, and scientifically useful [...]” [Bedau 1997: 376] This means that no ontological commitments to suprasummative entities have to be made, that we do not have to go beyond the sphere and

⁸¹“A case in point is mereological supervenience, the doctrine that the macro-properties of material things are supervenient on their micro-properties. It is this metaphysical doctrine of atomism that seems to underlie and support the enormously productive research strategy of micro-reduction in modern theoretical science.” [Kim 1993: 77]

⁸²Cf. Paoletti et al. [2017: 9] for a more detailed list of possible emergent phenomena.

the laws of the material and measurable world, and that the results of the interplay of parts (for example the functionality of the laptop) is predictable and therefore analyzable.

Ontologically emergent properties, on the other hand, “are neither reducible to nor determined by more basic features. Ontologically emergent features are features of systems or wholes that possess causal capacities not reducible to any of the intrinsic causal capacities of the parts nor to any of the (reducible) relations between the parts. It should be noted that epiphenomenal features do not meet the definition of ontological emergence.” [id.] With ‘epiphenomenal feature’, Silberstein et al. are referring to what is also classified as ‘resultant properties’. A resultant property is the property of an aggregate that depends on a specific arrangement of its parts and that ceases to exist as soon as the arrangement undergoes changes. To illustrate what is meant by this, Heil [2017: 45] uses the example of a tomato: “A tomato has the power to roll owing to its spherical shape. The tomato’s parts, however, need not be spherical, need not themselves have the power to roll. Yet it does not seem that the tomato’s shape is, in any interesting sense, an ontologically emergent property. The shape is just what you get when you put the tomato’s parts together in a particular way.”⁸³ To claim that *all* emergent properties are ultimately merely epiphenomenal or resultant and thus both predictable and reducible to the parts with their arrangements and interactions, although for the sake of practical description it makes sense to act *as if* such properties did exist, characterizes the position of an epistemological emergentist in the most general way. A rather strong and ontological view of emergence, however, “has the merit of preserving commonsense intuitions and corresponding to our everyday experience as agents in the world.” [Clayton 2006: 27] Related to Gestalt theory, we could say that if we were to only consider his insistence on the ontological priority and analyzability of stimulus parts and his hypothesis that we might encounter indivisible atomic parts all the way down, Ehrenfels’ position could be paralleled with epistemological emergentism. The ontological foundation of the Berlin school, on the other hand, would be more compatible with ontological emergentism, since in order for an emergent whole to determine its parts, even if it is taken to be caused by them, the whole has to possess a certain degree of independent reality.⁸⁴

(2) The acceptance of ontological emergence necessitates a hierarchical model in which what is emergent stands on a different vertical level than that from which it has emerged. In other words: “To say that emergent properties are irreducible to lower-level phenomena presupposes that reality is divided into a number of distinct levels or orders. [...] It follows that one of the major issues for emergence theory will involve the question when exactly one should speak of the emergence of a new level within the natural order.” [Clayton 2006: 3] Unlike the neo-platonic model of a ‘great chain of being’⁸⁵ in which the many emanate from the One in a top-down direction, however, contemporary emergentists, while keeping the many (i.e. the parts) at the

⁸³The more specific discourse of Gestalt theory distinguishes in this regard ‘global’ from ‘holistic’ properties.

The former are predictable properties of part agglomerations that are larger in physical size than the single parts, whereas “[h]olistic properties are relational properties that arise from the interrelations among the component properties of the stimulus.” [Wagemans e.a. 2012b: 9]. Cf. on this distinction also Kimchi [2015].

⁸⁴Cf. Stadler et al. [1994] on how and to what extent Gestalt theory, in particular Köhler’s hypothesis of psychophysical isomorphism, can be seen as a forerunner to emergentist theories of self-organization and synergetics.

⁸⁵Cf. on the history of this idea Lovejoy [2001].

bottom and the ‘ones’ (their unifications, their wholes) on higher levels, turn the direction upside down. Here it is not the many that emanate from the One, but the wholes emerge from the parts, and only in a subsequent step can a whole exert causal power (‘downward causation’) on its parts.⁸⁶ There is thus not one single source on the top of the hierarchy, but a multiplicity of sources at the bottom of it.

Within this framework, one of the numerous issues that emergentists have to take into consideration when postulating an emergent part-whole hierarchy of reality is how to avoid a parallel ordering of levels. In their article ‘Explaining Emergence: Towards an Ontology of Levels’, Emmech et al. [1997: 93] point out the danger of such a view: “One should avoid a parallelistic interpretation saying that one level is created out of another, and that it exists in parallel to the first level, as two separate levels without any further interaction. To exaggerate a little: if the *parallel* existence was true, as a human being you would not be one but several different entities on several different levels. Your physical body, your biological body and your psyche etc. – and it would seem rather miraculous that it always happened to be focused at the same point in space.” Instead of conceptualizing levels in a parallel fashion, like a pyramid with accumulative horizontal layers, the authors suggest an *inclusive* model, perhaps imaginable as an onion-skin model, in which the higher levels (a) contain the lower levels, (b) cannot be deduced from the lower levels, (c) are conditioned by and thus supervene on the lower levels, (c) cannot change the fundamental laws of the lower levels, and (e) have no less ontological priority than the lower levels.⁸⁷ The last point is important to specify. It says that the “higher levels are as ontologically pre-eminent as the lower ones, even if being presupposed by them, that is, they are defined by properties by special cases of the lower levels. In this respect, levels are ontologically parallel, but non-parallel in so far as they coexist.” [id.: 96] Although Emmech et al. do not mention it, such a more comprehensive and ‘spherical’ model of multiple layers would also do more justice to the increasing amount of experienceable *holism* that is attributable to higher levels.

Furthermore, and interestingly for the present context, the authors add that the “most non-parallel view of levels imaginable is what we will call the *Gestalt view*. The higher level manifests itself as a pattern or as special arrangement of entities of the lower. If you imagine yourself existing on the lower level you would hence not be able to realize or grasp the pattern which is only possible to conceive of at a higher level.” [id.: 96–7] Since emergent part-whole levels are a structure generally attributed to (regions of) reality itself instead of the perceiving subject, Emmech et al. refer to the more ontological stance of higher-order Gestalt qualities in Ehrenfels’ and Köhler’s attribution of self-organizing wholes in physical systems to “underline that the gestalt view need not by any means entail subjectivism and all its scepticist consequences: “[...] the notion of a Gestalt need not demand a constituting subject, at least not an empirical subject.” [id.: 97] Whether or not a realist reading of Ehrenfels and an emergentist reading

⁸⁶Cf. Clayton [2006: 4–7] on this different conception of part-whole hierarchy and other forerunners of current emergent theories.

⁸⁷“That levels are inclusive means that a higher level does not violate lower level laws, that the higher level is materially related to the lower one, and that this does not imply that the organizing principle of the higher level can be deduced from lower level laws. The organizing principles are, as the entities belonging to various levels, ontologically existing. It is not just epistemologically a level theory (saying that ontologically all entities belong to the lower level), but also ontological.” [Emmech et al. 1997: 105]

of Köhler is fully justifiable⁸⁸ is less important here than the problem that we face when we apply the idea of comprehensive levels of emergent properties to the way perceptual meaning is taken to emerge in Gestalts. On the face of it, it might seem as if the strong emergentist framework of more comprehensive wholes emerging out of less comprehensive parts would be perfectly compatible with a Gestaltist take on emergence. Probably the simplest example for the emergence of holistic properties in contemporary Gestalt research can be found in Pomerantz et al. [2011: 1336] and Wagemans et al. [2012b: 5], who argue that when we draw one black dot on a white sheet of paper, this element only has the property of *position/location*. If we draw a second dot next to it, we get a sum of two individual locations, but also the two suprasummative emergent properties of *proximity/distance* and *orientation/angle*. From the addition of a third dot the properties *(non)linearity* and *(a)symmetry* emerge, and “adding a fourth dot leaves us with all the individual, pairwise and triplet-wise features but adds one EF [emergent feature, M.S.] candidate unique to configurations of four dots: *surroundedness*, whereby one dot falls fully within the interior or fully in the exterior of the triangular convex hull defined by the first three dots [...]” [Pomerantz 2011: 1337] This simple yet representative example shows that in the conventional Gestaltist view, we proceed from parts on a lower level and yield more embracing wholes on higher levels, which have properties the parts do not have in isolation or summation.⁸⁹

However, when we take into consideration the emergence of perceptual meaning as it is developed by Pinna and advanced as splitting and merging by Koenderink, then we face the problem that differentiation into parts occurs on a level higher than grouping into wholes. Although we start out with individual stimuli and combine them into a Gestalt whole with emergent properties on a higher level, it is due to a *happening* to this whole that we have to proceed to (some of) the whole’s parts on a yet higher level to figure out *what has happened* to it. Only in so doing is it possible to arrive at a perceptual meaning at an even higher level of complexity, which embraces both the ideal grouped whole (*amodal wholeness*) and its contingent differentiation (*modal partialness*).⁹⁰ In other words, and as already described in section 7.1, while in Pinna’s framework a first perceptual step, after the segregation of stimuli as figure from a ground, consists in grouping and shaping these stimuli into a lawful and homogeneous

⁸⁸At least in ‘On Gestalt Qualities’, Ehrenfels attributes ontological priority and mind-independence only to the lower levels of stimuli. His views indeed become more realistic, but also more speculative and less empirically justifiable, however, in his metaphysical and theological *Kosmogonie* from 1916 (cf. id. [1990]), in which he “elevated Gestalt into a cosmic principle of psychic or spiritual order that was mankind’s only defense against chaos, entropy, and racial degeneration.” [Harrington 1996: 109] Köhler, in his 1920 *Die physischen Gestalten*, reduces perceived Gestalts to processes in the brain that are isomorphic with physical processes in nature instead of classifying them as emergent and thus as supra-physical.

⁸⁹Cf. on the internal hierarchy of perceived Gestalts with a generalization to other perceptible entities also Metzger [2001: 193]: “Jedes seelische Gebilde, jedes Ding, jeder Vorgang, jedes Erlebnis im engeren Sinn, bis hinunter zu den einfachsten Wahrnehmungsgestalten, weist eine bestimmte Gewichtsverteilung und Zentrierung auf; unter seinen Teilen, Stellen, Erstreckungen, Eigenschaften besteht eine *Rangordnung*, unter Umständen ein *Ableitungsverhältnis*. [...] Diese sind nicht erst in es hinein verlegt (projiziert, empföhlt), sondern gehören zu *seinem Wesen*. Es gibt eine natürliche Zentrierung und Gewichtsverteilung, für die zum Teil schon bestimmte Gestaltgesetze bekannt sind.”

⁹⁰“The perceptual meanings cannot be reduced only to the question of grouped and ungrouped components but represent the creation of a further level of complexity, where ungrouped objects become parts of a more holistic organization that takes into account similarities and differences of the previous level of organization and where similarities and differences do not weaken each other but synergistically complement each other and contribute to create a meaning.” [Pinna et al. 2009: 231]

whole, a second step breaks this whole up again into a heterogeneity of perceptual parts in order to – in a third step – combine homogeneity and heterogeneity into a perceptually meaningful whole. Since this perceptual meaning is always open for changes and re-interpretations due to variations of happenings⁹¹ or varying contexts,⁹² however, the hierarchy might constantly split up again into parts with emergent properties the amodal whole from which they emerge does not possess. Thus the higher one proceeds, i.e. the more meanings one perceives of a Gestalt, the more properties emerge from parts *and* wholes. Taking perceptual meaning seriously would thus imply a confrontation with the standard conceptualization of emergent levels from parts to wholes for which differentiation does not occur in an upwards (or ‘outwards’, in the onion-skin model) direction. What is needed to account for perceptual meaning – and I would like to account for it to integrate emergent perceptual meanings into the ontological nature of PWO – is a more flexible model of emergence in which ‘higher’ or ‘more comprehensive’ not only implies wholification, but also partition (see ‘Dif₅’ below). Such a model of levels is admittedly hard to image, because it itself can only emerge out of a particular phenomenon in a shape unique to this phenomenon instead of being imposed on it as a static geometrical figure like a pyramid or a sphere. The question is if such a model or an approach towards it is available in the recent literature on emergence.

(3) Before suggesting one promising model, it is necessary to mention a third recurrent theme in the recent literature on emergence: downward causation. Already the adjective ‘downward’ presupposes a vertical hierarchy of levels, which in turn presupposes an ontological understanding of emergence. Downward causation is therefore “typically defined as the causation of lower-level effects by higher level-entities.” [Paoletti et al. 2017: 1] On the one hand and in a rather intuitive or commonsensical perspective, the idea of downward causation might appear as immediately compelling. Plenty of examples can be found that seem to illustrate and thereby confirm it: Social groups such as nations determine the behavior of their members via legal and normative regulations; an organic whole such as a body assigns a certain function to its cells and organs to make them work in support of the whole’s survival; the single stones of a mosaic provide an aesthetic expression only in relation to the more comprehensive picture that emerges from their particular arrangement. On the other hand and in a rather logical and ontological perspective, the idea of downward causation raises fundamental problems which make every attempt at providing precise and coherent approaches towards it a complicated matter.⁹³ The complications mainly lie in the paradoxical nature of downward causation, because, as Hulswit [2006: 265] puts it, “downward causation seems to violate the principle of irreversibility that is considered to be inherent to the principle of causation. By saying that B is the cause of A, we mean among other things that B explains or conditions or causes A and that A does not explain or condition or cause B.” But how can something cause its own cause, or, in a weaker formulation, how can a whole with emergent properties exert causal influence on the parts or processes by which it is caused? It is clear that in order to solve this paradox or at least to accept and argue in favor of its existence, a theory of two-sided part-whole dependency

⁹¹Cf. Pinna [2010: 71].

⁹²Id.: 65.

⁹³Gillet [2017: 243] states this point clearly: “Although scientific emergentists [...] have articulated the broad outlines of this novel position, many of its key details have been left unarticulated. In particular, scientific emergentists have not given us precise accounts of the Fundamental Downward Relation.”

is required.⁹⁴

In order to do so, however, some other problems should be addressed, one of which concerns the question whether upwards and downwards causation occurs synchronically or diachronically, i.e. whether parts and whole causally influence each other at the same time or whether downward causation happens temporally before or after upwards causation.⁹⁵ Furthermore, in Campbell's original definition of downward causation, he refers to 'laws' of higher levels. Gestalt theorists in the tradition of Wertheimer also speak of 'laws' or 'principles' of grouping.⁹⁶ But what such laws or principles really mean and presuppose often remains an open question, the answering of which could help to keep under control the well-known inflation of grouping principles. Accordingly, Heil [2017: 46] poses the following legitimate questions: "Are laws governing higher-level systems derivable from lower-level 'fundamental' laws? Are higher-level laws 'special cases' of laws at lower levels? [...] What features of the universe answer to statements of laws?" Furthermore, Hulswit identifies in the literature on downward causation an important yet implicit distinction concerning the question of what effectuates downward causation: Is it effectuated by *general principles* or laws residing in a particular whole or is it effectuated by the particular whole itself such that the causation in question is a *concrete event*?⁹⁷ Such problems are not only relevant for an exact determination of the ontological nature of PWO that naturally involves a strong version of emergence, but also for every comprehensive theory on supra-summative Gestalt perception. For reasons of space and time, however, it is unfeasible to elaborate on this question in the present project.

More importantly right now and perhaps more realizable for an implementation of the idea of downward causation into the perception of part-whole relations is a specification of what *kind* of causation a whole has on its parts. In the context of Gestalt theory, for which emergence and part-whole hierarchies play a central role, as we have seen, Wertheimer speaks of "*whole-determinations of parts*" (*Ganzbedingtheiten*) [Wertheimer 1938: 14]. Even modifications of parts in a whole "are determined by whole-conditions and the events initiated by their occurrence run a course defined by the laws of functional dependence in wholes." [id.] As with downward causation in the discourse on emergence, the Gestaltist 'downward determination' can be interpreted in several ways.

On the most general level, downward causation can be understood either as involving a proper causal relation from the emerged whole to its constitutive parts or as a relation in which a whole acts downwards upon its parts in a non-causal yet otherwise influential way. A proper causal relation, which is already suggested by the very term 'downward *causation*', would imply

⁹⁴Heil [2017: 43] puts it as follows: "The conception of levels here is broadly mereological: lower-level items are parts of higher-level 'systems'. Downward causation would occur when encompassing wholes interact causally with their parts. The result is a two-way—lower- to higher-level and higher- to lower-level—dependence: wholes that depend on assemblages of parts causally constrain the parts' behavior."

⁹⁵Cf. Kim [2000: 307], who argues that synchronic downward causation would violate the principle of transitivity that is intrinsic to causation, which is why diachronic causation is preferable. Cf. also Hulswit [2006: 271], who states that this problem only occurs because Kim understands causality as efficient causality in the Aristotelian sense, whereas he states that we can understand causality also as formal causality: the "fact that similar patterns and forms appear in nature in settings that seem to bear no relation to one another [...] led to the idea that there must be some causal 'influence' which, contrary to efficient causal influence, is independent from the components of the system, and which explains the form the system takes."

⁹⁶Cf. subsection 6.3.2.

⁹⁷Cf. Hulswit [2006: 266–270].

firstly that a whole w would cause its parts p_{1-n} in the sense of *bring them into existence* or *actualizing* them, like a driver of a car causes an accident that had not existed prior to its being caused by the driver. This is, however, not the case for an emergent whole or a whole with emergent properties that exert(s) downward causation, because the constituting parts on the lower level must either exist prior to or at least simultaneous with the higher level. A melody, understood as a transposable whole with Gestalt qualities as defined by Ehrenfels, does not cause, in the sense of create, its own tones, although the particular sound or sounding-together of the tones may depend on the more general character of the melody. Moreover, a proper causation would also imply an asymmetrical relation between w and p_{1-n} , such that if p_{1-n} causes (i.e. makes emerge) w , then w cannot function as the cause for p_{1-n} in return (what Hulsmit calls the ‘paradox of downward causation’). The best example for this would be the impossibility of a perpetuum mobile, which would cause the energy that is needed to cause its own functioning. In addition, proper causation also implies that the cause is spatiotemporally external to its effect, in the same way that a billiard ball B_1 , which causes billiard ball B_2 to move, is spatiotemporally external to the latter. An emergent higher level, however, cannot be said to exist spatiotemporally external to its lower level constituents. For example, the emergent isosceles triangle that ‘causes’ a perceptible connection between the three dots \therefore is not an outside interference but an internal (retro)activity of a self-organizing system in a nutshell.

For reasons like these, it is worthwhile to consider alternatives to proper causal relations between the higher level of w and the lower level of p_{1-n} , i.e. ‘non-causal’ kinds of the then misleading term ‘downward causation’. After all, the mere fact that a non-causal relation from w to p_{1-n} can be assumed at all should not be strange within a strong emergentist framework that already postulates a non-causal upwards relation from p_{1-n} to w . It is helpful for the further line of argumentation and its application to perceptual meaning of dynamic part-whole interdependence that Paoletti et al. [2017: 7] list four possible alternatives that have been elaborated on in the literature on emergence:

“First, higher-level entities could *select* the powers to be activated at the lower level. What *can* happen at the lower level is wider than what *actually* happens. The higher-level entities are responsible for the selection of certain lower-level outcomes, rather than others, by making it the case that certain powers rather than others are activated.

Secondly, the higher-level entities could *constrain* what happens at the lower level, by imposing certain limits on the lower-level outcomes, by reducing the degrees of freedom of lower-level parameters, and so on.⁹⁸

Thirdly, the higher-level entities could *structure* the lower-level goings-on in specific ways, so as to generate specific outcomes.

Fourthly and finally, the higher-level entities could provide the lower-level entities with *novel* powers.”

⁹⁸This alternative would be most in line both with Campbell’s [1974: 180] original introduction of downward causation into the current discourse on emergence (“all processes at the lower levels of a hierarchy are restrained by and act in conformity to the laws of the higher levels.”) and with Wertheimer’s notion of ‘whole-determination’.

To me it seems that these four alternatives are neither mutually exclusive, nor does the realization of just one of them or a combination of them form the only veridical explanation of downward causation. Making claims concerning emergence, levels of reality and downward causation relies for the most part, despite the intuitive and scientific examples and arguments that may be given, on metaphysical speculation, which is, in the end, a mixture of ideally justifiable (inter-)personal preference, experiential evidence in the broadest sense, and applicability to one or more ontological domains. If we determine the ontological domain to be the empirical perception of parts and whole, in particular their perceptible dynamic interplay based on their ontological interdependence, then there is at least one model in the recent literature on emergence that deserves special attention for this matter. This model mainly goes with the fourth alternative listed by Paoletti et al., and in so doing, it deals with a number of difficulties that according to Paoletti et al. every consistent theory of downward causation is confronted with:

- Dif₁ It should be able to show that, parallel to the distinction between epistemological and ontological emergence, downward causation is not just an explanatory principle, but that there are “real relations of top-down influence” [id.].
- Dif₂ It should show how the reductionist assumption of a ‘causal closure principle’, which generally says that entities on the lowest level, i.e. the micro-physical level, cause horizontally but not upwards,⁹⁹ can be overcome in order to make upwards emergence, on which downwards causation relies, possible at all.
- Dif₃ It should “demonstrate that a non-reductionist conception of downward causation has to be favored over a reductionist one.” [id.]
- Dif₄ It should offer examples of how it can be applied to science. For the present context, this difficulty should also be related to research on Gestalt perception as perceptual meaning.

Let me add to this two more difficulties that we encountered in the previous argumentation, viz. that a consistent theory on Gestalt-emergence and downward causation should

- Dif₅ avoid the exclusive hierarchization of $\begin{matrix} \text{whole} \\ \updownarrow \\ \text{parts} \end{matrix}$ when it is – in the case of perceptual meaning – also the heterogeneity of parts that appears on a higher level, such that also $\begin{matrix} \text{parts} \\ \updownarrow \\ \text{whole} \end{matrix}$, or more appropriately $\begin{matrix} \text{parts whole} \\ \updownarrow \\ \text{whole parts} \end{matrix}$.
- Dif₆ suggest a dynamic framework in which the process of perceptual meaning creation of part-whole structures does not stop with a unification of whole homogeneity and part heterogeneity, but can continue and lead to novel meanings a Gestalt entity might display, such that wholeness of meaning is only a transitional stage instead of the final upshot.

⁹⁹Kim [2005: 15] defines this principle as follows: “*The causal closure of the physical domain.* If a physical event has a cause at t , then it has a physical cause at t .”

7.3.2 Emergence and Demergence

In their 2017 article ‘Emergence and Demergence’, R. Anjum and S. Mumford delineate a model that could, to a greater or lesser extent, address these six difficulties. I would like to take this model as a basis for an emergentist characterization of PWO within the restricted realm of empirical perception. This means that in addition to my summary of the authors’ model, I will suggest minor interpretative amendments that are intended to make this model fit into the Gestalt context, particularly of perceptual meaning (section 7.1) and splitting/merging (7.2), i.e. of the dynamic part-whole interdependence that has been developed so far. To begin with, the authors distinguish the practical side of emergence and downward causality from its theoretical side. In the practices of science and everyday life, we take these phenomena for granted: We lift a chair (emergent whole), not its molecules (lower level physical parts); we change our whole lifestyle to treat (i.e. exert a downward influence on) a concrete bodily or mental problem.¹⁰⁰ It is rather on the theoretical, one could also say metaphysical or ontological side, where we encounter difficulties like the ones just listed (dif₁₋₆). But only by theoretically elaborating on emergence can we understand and explain what we take to be a ‘brute fact’ in practice.¹⁰¹

More specifically and in addressing dif₁, the authors attempt to theoretically understand and explain strong, i.e. ontological emergence, “where something genuinely novel emerges in nature” [id.: 93] As one example among others that is particularly interesting for our compilation of perceptual part-whole interdependence, they mention “[m]eaning emerging from meaningless components”.¹⁰² If we take ‘meaningless components’ to be stimulus parts and ‘meaning’ to be meaningful wholes, we would only have to insert the intermediate steps of homogeneous grouping/merging and heterogeneous differentiation/splitting to complete the basic framework suggested by my interpretation of Pinna and Koenderink. This framework’s problematization of the conventional directionality of a part-whole hierarchy (dif₅) can then be approached with the authors’ clarification that in their model, we do not have to “accept a strict hierarchy in nature or pyramid of the sciences in order to argue for emergence, or to state it in terms of levels of phenomena. The notions of relatively higher- and lower-level phenomena can be outlined in a metaphysically innocuous way in terms of part-whole composition. On this use of the term, if one set of phenomena jointly composes another phenomenon, then the former is lower level than the latter.” [id.: 94] However, this ‘relativization’ of a part-whole hierarchy that is supposed to be inscribed into the fabric of nature still implies that it is always the many that are lower, such that composition is exclusively bottom-up and decomposition exclusively top-down. It thus seems as if, on a first glance, dif₅ is not solved in a manner such that it would fit into the framework of perceptual meaning with splitting/merging, and therefore not fit what the determination of PWO’s ontological nature consists in so far.

This impression is enforced by the way the authors continue to develop a positive account of dif₁. In this account, they define emergent phenomena as those phenomena “where wholes

¹⁰⁰Cf. Anjum et al. [2017: 92].

¹⁰¹“There has to be some intelligible sense in which emergent phenomenon, *E*, emerges from its base-level phenomenon, *B*, rather than from anything else; or that *E* is just free floating (as in forms of substance dualism). The emergence of *E* cannot be just a brute fact.” [id.: 93]

¹⁰²Other examples are “Life emerging from lifeless components”, “Mind emerging from mindless components”, “Free agency emerging from nomologically constrained components”, “Social phenomena emerging from individual components” [id.: 93]

have powers that are not possessed by their parts” [id.: 95], whereby “the powers of the wholes will be higher level than the powers of the parts of which they are composed.” [id.] But how, to continue with dif_1 and to leave dif_5 aside for the moment, does an emergent power of a whole come into existence? What are the existence conditions of ontological emergence? These neither consist in ‘mere composition’, which we could also call a ‘summation’ of parts,¹⁰³ nor do they consist in what the authors call ‘nonlinear composition’, where the power resulting from the composition of parts is, unlike in a mere composition, not proportional to the sum of the parts. For example: “Candy bars cause pleasure when eaten but in a nonlinear way. 10 candy bars do not produce 10x the pleasure of one [...]. It is probable that consumption of 10 candy bars in short order actually produces negative pleasure.” [id.: 97] In the realm of visual part-whole perception, we could say that while the sum of two grains of rice in front of you is a quantitative and countable duality, the sum of one thousand grains of rice in front of you is not ‘one-thousandness’, but an uncountable heap which still has no emergent properties (be it Gestalt laws, be it perceptual meaning) in the proper sense.

Furthermore, “[c]ounting nonlinear composition as emergent would, again, make the phenomenon too commonplace.” [id.: 97] This also applies to new qualities which wholes may possess due to certain spatial relations between their constitutive parts, for example when something “is coloured even though its parts are not, or a tabletop is square, though its parts are two triangles. [...] To this extent, composition is merely aggregation along with appropriate relatedness, which we think is still not strong enough.” [id.] This can be called ‘modest emergence’. In the present context, it is important to mention that ruling out part-relatedness from strong emergence and classifying it as a ‘modest’ type would imply that the classical Gestalt laws or principles of grouping, such as proximity or symmetry,¹⁰⁴ do not account for strong emergence, since they are reducible to spatial (and/or temporal, in the acoustic sphere) ordering of parts. I personally sympathize with this stance, since it would, on the one hand, lead to fewer ontological commitments caused by proliferations of strong emergent wholes. For instance, why should and how could a line that emerges from two juxtaposed dots count as an ontologically novel entity with causal powers on its own, even if its existence is reducible to the cognitive domain and not to a mind-independent sphere? On the other hand, it would leave open the possibility of strong emergence of perceptual meanings, since and *if* these were to fall into the range of what the authors call the ‘causal-transformative model of emergence’.

This ‘causal-transformative model’ is a model according to “which some powers emerge from the components interacting and being changed by their causal participation in the whole.” [id.: 98] While the mere order or arrangement of parts is insufficient to declare a resulting whole as ontologically emergent because in this case the parts cannot be said to undergo any change, in the model that is proffered here, it is the transformation of parts that leads to novelty. Novelty thus comprises not only the novelty of the whole, but also a certain ‘renaissance’ of the parts themselves. Although the kind of transformation the parts undergo might be *numerical*,

¹⁰³“A mere addition of powers [...] does not adequately satisfy the pre-theoretical requirement of emergence that it involves novelty in the higher-level phenomena. There is perhaps novelty in some sense—the whole does have something that the parts lack—but this comes from the aggregation of powers alone. Confirmation that this is insufficient novelty is that it would make emergence far too cheap and easy and virtually ubiquitous. Every complex whole—that is, every whole that is made out of parts—would have emergent powers, which were just the addition of the powers of the parts.” [id.: 96]

¹⁰⁴Cf. subsection 6.3.2.

for example in quantum entanglement,¹⁰⁵ it has to be at least *qualitative* in order to cause emergence. Scientific examples (cf. dif₄) next to quantum entanglement would be chemical bondings, e.g. of hydrogen and oxygen into H₂O¹⁰⁶ or of chlorine and sodium into NaCl.¹⁰⁷ A spontaneously chosen example of mine related to perceptual meaning would be the emotional expression of a face in which every relevant part of it, in particular the eyes and the mouth, qualitatively changes in order to make the expression of the whole emerge and visible. A sad eye can only look sad if it is seen in a sad face, and the question of why an emotion is expressed is nothing but the evidence that there is a meaning, i.e. a *happening* in the previously discussed sense,¹⁰⁸ behind it. In the context of such a meaning, a part is not the same as it was before it entered into the process of meaning creation, which is why the whole cannot relate to it anymore: “once composed into a whole, the parts no longer exist as they did prior to that composition; so you cannot say that the whole depends on those original parts, or that same parts = same whole, when the parts are not the same as before. The parts have been transformed in the process of forming the whole, and thus lose their qualitative identity.” [id.: 101]

The transformation of parts has to be understood as initiating the upwards movement towards the whole, not as a result of downwards causation from the whole to the parts. While the former is defined as emergence and causes wholes with emergent properties, the latter is called ‘demergence’ and causes novel properties in the parts via the emergent properties of the wholes.¹⁰⁹ The transformation of parts in this model is thus a “two-stage transformation [...] for the constituent parts of wholes. They undergo a causal transformation in composing an emergent power. But that emergent – hence higher-level – power is then capable of subsequent downward causal influence, producing further change in the parts.” [id.: 104] If, in the context of part-whole perception, we were only to remain on the higher level, for example because in some cases highlighted by classical Gestalt theory it is the directly perceptible and thus supposedly primary one, we would ignore that and how the transformations of the parts constantly shape the meaning of the whole, which is the meaning of the parts as well, since the emergent causal powers of the whole act on the parts. Also, the persistence on one vertical level alone

¹⁰⁵“When two particles are entangled, they effectively form a causally connected single unit in which, arguably, the numerical identity of the parts has been lost. If we had two electrons, e_1 and e_2 , then once they have become entangled, there might be no fact of the matter about which is e_1 and which is e_2 .” [id.: 98]

¹⁰⁶“Chemical bonding involves qualitative changes in the elements which enter into the bonding. In forming a whole, the parts have to undergo change. Consider the formation of H₂O, which prima facie looks entirely a matter of additive composition. A hydrogen atom has a vacant space on its outer shell of electrons and an oxygen atom has two vacant spaces. When they have bonded, they can be understood as sharing electrons, thereby completing the outer shells of all the atoms—two of them being hydrogen—which thereby forms a stable molecule. The three ‘parts’ have thus each changed in order to form the whole. This change can be at least a part of the explanation why their powers have not simply aggregated. Water, for example, has a power to put out fires, but neither of the components of water can put out fires; indeed, they would fuel them.” [id.]

¹⁰⁷“To take another example, chlorine is a poisonous gas; sodium ignites spontaneously on water. But sodium chloride has neither of these causal powers. And it tastes salty, which none of its components do.” [id.]

¹⁰⁸Cf. section 7.1.

¹⁰⁹“So what this tells us is that emergent powers can then act on their parts, and this is what we mean by downward causal influence. It might be useful to think of this as, to coin a phrase, demergence. Emergence is where there are new powers of wholes in virtue of causal interactions among their parts; demergence is where there are subsequent new powers of the parts in virtue of the causal action of the whole upon them.” [id.: 102]

would hide the fact that – according to the present model – there is not just one upwards movement and then one downwards movement in return in a diachronic fashion. Instead, the interplay of emergence and demergence is, in principle, a *simultaneous* process. Although they might be temporarily extended, cause and effect exist and cause each other’s qualities at the same time: “the effect does not complete itself instantly: it takes time to do so. In that time, there is a process of ongoing change that is completed when the cause has eventually exhausted itself and ceased to act. Cause and effect are both temporally extended, therefore, but their extensions are simultaneous.” [id.: 101] Also, in Pinna’s model of perceptual meaning, the single steps in which meaning emerges should not be regarded as a temporal sequence, but rather as a phenomenal appearance.¹¹⁰

Moreover, since both the parts and the whole function as causes in the causal-transformative model, both can exhaust themselves. Related to the perceptual meaning of Gestalts, we could say that the simultaneous ongoing and mutual process of part-whole causation as emergence/demergence stops, for example, when a happening on the part level comes to an end (e.g. if a fungal decay is removed from a tree’s trunk, the whole tree can become and appear healthy again) or when a whole initiates the end of a happening in its parts (e.g. the introduction of a law may end the protesting of a social community’s members). Otherwise, this bidirectional process continues in time and is thus in agreement with the temporality involved in the awareness of a perceptible object, including its being split and merged. The notion of demergence is also in agreement with the observation that, as Pinna et al. [2009: 228] put it, “[a]s the whole meaning emerges, each component adjusts to it and takes on new perceptual properties derived from and synergistic with that meaning [i.e. demergence, M.S.] and, *vice versa*, the whole meaning emerges as a result of what is perceived in every single component.”

However, as we have seen, not every arrangement of parts is a cause for an emergent whole and is therefore not itself transformable. The condition for parts to become transformed, both as causes and simultaneously as effects of demergence via the creation of a whole, is that they have to *interact*. This happens for example via entanglement and bonding in Anjum et al.’s examples or via sharing and expressing the same emotional quality in my example of the face. The interaction of parts presupposes their entering into a “mutual manifestation partnership; and this requires that, in addition to the components existing, they must also be suitably related.” [id.: 100] One way of relation is by spatial arrangement and proximity, for instance when a match and its box interact to create fire.¹¹¹ I think that the countless textbook examples and experiments of Gestalt grouping based on spatially close dots and lines, on the other hand, cannot be interpreted in these terms of interaction, since the stimulus parts do not and *cannot* change if a perceptual whole is perceived. For example, the single tones $t_1 t_2 t_3$ of a melody $T = \{t_1 t_2 t_3\}$ do not change into $t_4 t_5 t_6$ while T is instantiated, otherwise it would not be T that is perceptible.¹¹² Spatial arrangement and proximity is not necessary, however, for a mutual

¹¹⁰“These steps have only a phenomenal status without any definitive temporal order among them. They are arbitrary phenomenal separations of a perceptual result that appears indivisible.” [Pinna et al. 2009: 229]

¹¹¹Cf. id. [100].

¹¹²Cf. for example Pomerantz et al. [1977: 434], for whom part interaction effectuates emergent features of a Gestalt without involving any change in the stimuli parts: “The existence of configural superiority effects might seem to imply that wholes are not recognized by prior recognition of parts such as individual line segments. Indeed, the position we have taken here is that wholes are perceived by their emergent features which are not the parts themselves but rather stem from the interaction of these parts. Thus, a figure such

manifestation of parts: Users of social media, for example, interact and often are affected by the emerged digital community without spatial proximity. It is also not necessary that every mutual manifestation leads to an emergent whole and thus effectuates the transformation of parts. What the Gestaltists call and reject as the ‘constancy hypothesis’ on a perceptual level, i.e. that a particular arrangement of stimuli necessarily leads to a particular percept, the causal-transformative model calls and rejects as ‘dispositional modality’ on an ontological level.¹¹³ This makes the latter, among others, applicable to the former, without sharing its tendencies towards one-sided part-whole primacy. What is necessary, however, is a certain continuity of the mutual manifestation. If the parts stop interacting and thus transforming, then the emergent whole stops developing causal powers that retroact on the parts. In other words, for the emergence/demergence interplay to take place, there has to be an ongoing, dynamic interaction among the then constantly transforming parts. “The idea is that emergent properties are sustained through the ongoing activity; that is, through the causal process of interaction of the parts. A static instantaneous constitution view wouldn’t provide this.” [id.: 101] For example, the aesthetic effect of a poem is generally stronger the more its individual parts (stanzas, verses, words, syllables) interact and receive new meanings, i.e. ‘transform’ when interrelated. The transformation then continues when the meaning(s) of the whole demerges into these parts.

Let us now, before turning to dif₅, delineate how Anjum et al.’s ‘causal transformative model’ answers to dif₁₋₄ and dif₆. Dif₁ concerns the distinction between epistemological and ontological emergence, but in the downwards direction. As we have seen, the model introduces the notion of demergence, which is genuinely ontological and not just based on explanatory reasons, because it is taken to cause novel powers in the parts through the emerged whole. Additional to novel powers of already existing parts in the lower level, the model even enables the process of demergence to create novel parts.¹¹⁴ A good example for the creation of a part in the context of perceptual meaning would be the case of holes. Taken as an entity in itself, a hole does not exist. Only when it is surrounded by other entities which together create – as parts – a topological whole, does a hole come into existence and gain as well as distribute perceptual meaning.¹¹⁵

Regarding dif₂, the ontological account of emergence that is presupposed by the ontological

as a triangle is not recognized by the detection of its component line segments but by the detection of more complex features such as intersections or closedness.” But if the stimuli parts were to undergo change during the process of emergence, i.e. if the component lines were to assume a different geometrical form, then no triangle could result from their interaction.

¹¹³“First, because this is a causal account of emergence, and all cases of causation are subject to the possibility of interference and prevention, they are to be understood as operating with what we call the dispositional modality [...]. This means that we could have the same type of components, appropriately arranged, and while they may tend to form a certain higher-level emergent property, there is no guarantee that they will do so. We cannot say simply that if we have the same components within *B*, we will have the emergent phenomenon *E*. That depends on the causation working out successfully, and many causes don’t succeed in manifesting their effects.” [Anjum et al. 2017: 101]

¹¹⁴“However, emergent powers can actually affect what there is in the base, effectively making new *B*-level phenomena, such as when scientists synthesise new elements, like ununoctium, that do not naturally occur. So demergence can lead not only to new properties/powers at the lower-level, but in special cases the creation of new entities too.” [id.: 107]

¹¹⁵On the role and perception of holes in Gestaltlike wholes cf. for example Nelson et al. [2001] and Bertamini et al. [2012; 2015].

account of demergence makes the authors argue against the principle of causal closure, according to which the micro-level, which is generally taken to be physical, can only cause physical entities and not, for example, immaterial wholes of a higher level such as minds, social structures or – in our case – perceptual meanings.¹¹⁶ On the one hand, the ‘causal transformative model’ takes the micro-level indeed to be the physical one, which makes everything that emerges from it dependent on physical laws and entities.¹¹⁷ We can easily equate this stance with the ontological status that stimulus parts are taken to hold in the Gestalt context and in so doing offer another reason why this model can be applied to meaningful Gestalt perception. On the other hand, this model claims that the micro-physical level, which would also be the level of stimuli on which Gestalts depend, changes in the process of emergence/demergence, such that higher level phenomena indeed causally influence the physical nature of reality in the same way that they are simultaneously influenced by it. Stimuli do not change by their being perceived, but their inherent meaning might do to such an extent that they should best be approached from the perspective of the higher-level whole, since “the basal level is changed. When the base elements enter into those causal relations, they transform such that sometimes they can no longer be treated as the underlying elements or units. The higher-level whole now has to be understood as the unit because it makes no sense to disaggregate it into its components. The components have been altered, as we see with quantum entanglement and a host of other cases. We contend, therefore, that it does make sense to reject the causal closure of the basal level.” [id.: 107]

This rejection of the causal closure principle and the ontological account of emergence/demergence that goes along with it has the advantage – ad dif₃ – that it offers a *positive* account of higher-level/lower-level interaction. This account is neither forced to *reduce* wholes to the physical level, nor to *constrain* and thus *negatively* determine the emergent or demergent powers of wholes or parts. Instead of claiming that the possibility of what parts can become is restricted as soon as they transform to create a whole, or that a whole cannot be anything else than what the interaction of parts determines it to become, the causal-transformative model allows for a high degree of what can be called ‘ontological freedom’ in that not necessarily predictable novel powers and entities are created during the processes of part-part and part-whole interactions.¹¹⁸ This stance would be an alternative to Wertheimer’s notion of ‘whole-determination’, which

¹¹⁶Anjum et al. [id.: 105–6] describe the idea behind the causal closure principle as follows: “According to a standard way of thinking, everything at the base level is causally closed. Thus, a base-level state or event, B^* , must be caused completely by another base-level state or states, B (whatever we take the relation of causal relations to be). Emergent phenomena seemingly threaten this view. Suppose E is emergently dependent on B . If E is supposed to be able, through downward action, to cause B^* , then the base level cannot be causally closed. Just as bad, if E causes E^* , another high-level phenomenon, but E^* is supposedly emergently dependent on B^* , then the causal closure of the base level is still threatened.”

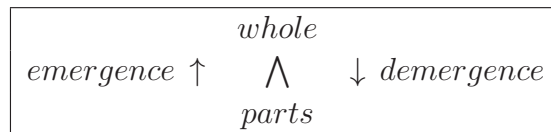
¹¹⁷“It should also be noted that our emergentism still gives a special place to the base level. It is from the base properties that higher-level properties emerge—they are causally dependent on them—as long as they enter into the ‘right’ causal relations with each other. So it is consistent with the idea that everything is ontologically dependent in some sense on micro-physical entities [...]” [id.: 107]

¹¹⁸“Fourth, our characterisation of emergence is a positive one, in answer to Kim’s first challenge. In Kim’s account, a property E is emergent when it depends upon but is not reducible to B . But this, he says, is a negative characterisation, like when we say that something is not-red, which has no unificatory or explanatory power. Our account does not take such a route. Rather, we provide positive conditions for what must happen to E in order for it to count as emergent: through their interaction the parts undergo a change from which the whole they compose has a new power. This is as positive a characterisation as any can be.” [id.: 105]

basically constrains the development potentialities of a Gestalt's parts instead of supporting their autonomy to further transform and make something emerge by it.

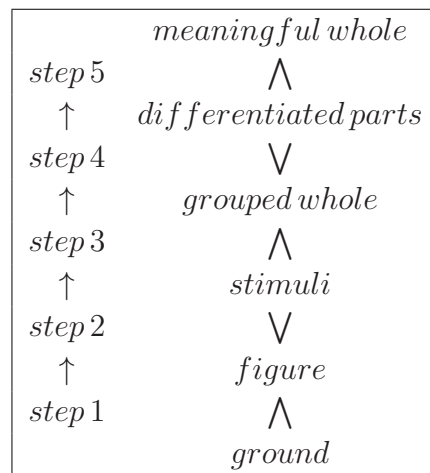
Regarding dif₄, examples for the model's scientific applications have been given, both by the authors themselves and by my attempt to relate this model to part-whole perception. What is more, the authors also describe how this model could deal with dif₆, viz. by providing a dynamic and simultaneous, ontologically enriching interaction between the lower and the higher level. It is as if both parts and whole constantly mirror themselves and in this act of mirroring re-create themselves and/or their qualities and causal powers. This is not an endless process, however, because it can end whenever a "cause has eventually exhausted itself and ceases to act." [id.: 101]

In order to apply this model of ontological emergence/demergence entirely to (at least my interpretation of) the phenomenon of perceptual meaning and its specification as splitting/merging, however, we need to find a solution for dif₅. There are three options available. Either we opt for the classical, pyramidal hierarchy in which wholes stand higher than parts. This would be in line with the causal-transformative model, according to which, as we have seen, "the powers of the wholes will be higher level than the powers of the parts of which they are composed." [id.: 95] The dynamics of this model consists in its mutually enriching and simultaneous up and down movement between parts on the lower level and a whole on the higher level:



However, it would contradict the kind of hierarchical shape that seems to be presupposed by Pinna for the step sequence towards perceptual meaning, which rather looks, with a minor variation to the original formulation,¹¹⁹ like the following:

¹¹⁹In the most explicit formulation of Pinna's model, there are four and not five perceptual steps towards a meaningful whole. He does not posit a step from the accentuation of a figure from a ground to the pre-perceptual differentiation of this figure into single stimuli. I think, however, that we should include this step, not only because it is in line with the general paradigm of Gestalt theory to make at least a functional if not an ontological distinction between stimuli and their grouping into perceptual wholes with perceptual parts, but also because in other places, Pinna includes the intermediate step of stimuli into his vertical framework. Here is the most explicit formulation, followed by references to passages in which Pinna includes this step: "Phenomenally, there are several steps in the 'perceptual organization' (that is also a 'visual interpretation') of the previous whole object in specific shapes and meanings. The first perceptual step is the 'segregation' of each component from the background. The second one is 'putting together' or grouping the segregated elements in homogeneous wholes on the basis of similarity of shape. The third is the complementary 'separation' and the clear distinction of the wholes on the basis of dissimilarity. Similarities and dissimilarities lead to the fourth and final step, where all the differentiated wholes and each single element are put together again by virtue of another and more global grouping factor that overcomes the dissimilarities of the components: it is some kind of *meaning* principle that perceptually solves the differences among wholes and elements at a higher level making them appear strongly linked just by virtue of the differences. In this way similarities and dissimilarities complement and do not exclude each other. This can be the level where the perceptual meanings are established." [Pinna et al. 2009: 228–9] The intermediate step of stimuli is mentioned, however, in Pinna et al. [2009: 231, 267]; Pinna [2010: 70]; and id. [2011a: 227].



Thus, whereas Anjum et al. seem to advocate a model in which ‘upwards’ means ‘unification’ and ‘downwards’ means ‘differentiation’, in Pinna’s model there is only an ‘upwards’, which can either mean ‘unification’ or ‘differentiation’. In my understanding of it, this latter ‘upwards’ is, in principle, open-ended, because if there are new happenings in the differentiated parts, we have to open up or ‘split’ (Koenderink) the meaningful whole again and perceive the now adjusted parts to repeat the fifth step towards a whole with a then novel meaning. While the first model is preferable due to its higher degree of simplicity and broader applicability to ontological regions beyond empirical perception, the second model seems to be perfectly tailored to the Gestalt tradition with the significant turn towards part-whole interdependence and perceptual meaning as happening. The problem with both models, however, is that their hierarchical pattern appears to be predetermined such that it can be imposed on the phenomena in question. Their stable geometrical forms make them rather a model *for* than a model *of* part-whole interdependence. While what happens inside either model may indeed be dynamic and unpredictable, the model itself does not change and is therefore disproportionately more stable than the often unique and ambiguous transitions of parts into a whole or vice versa, be it in reality, in general or in empirical perception in particular. What is presupposed is always a certain type of vertical hierarchy, a sequence or simultaneity of steps that have already been figured out beforehand to make the phenomena fit into the model.

Instead of unnecessarily and prematurely rejecting both models due to their static architecture, however, it is also possible to combine them in order to create and opt for a third option. For this third option, we could combine the valuable insight of the causal-transformative model of a creative downwards movement (demergence) with the equally valuable insight of the perceptual-meaning model of a splitting in an upwards direction. The third option would then consist in a dynamization of the hierarchical pattern itself, not only of the phenomena it is applicable to. If what is ‘up’ and what is ‘down’, i.e. if the position of parts and whole, is not accessible by either going upwards or downwards on a vertical scale, but by *making the pattern of the model itself reversible* such that up and down are rescaling and switchable according to the spontaneous transitions of the part-whole structure, then we could solve dif₅ by providing a dynamic picture of meaningful, perceptible and interdependent part-whole phenomena. This picture, as an ambiguous image itself, could then correspond to the oscillatory nature of the phenomena themselves. In a final step towards the determination of the ontological nature of PWO, I would like to point towards the possibility of such a reversible model by drawing on Gestaltist research on multistability, which has been particularly evident in figure-ground re-

versals. This will serve to clarify the current vagueness in which the third option might appear at the moment. For a preliminary impression, the reversible model could be visually sketched like **XX**, where up and down can denote either parts (many) or one (whole). But before going deeper into that, let me formulate the third principle for PWO in the empirical sphere, based on my agreement with the causal-transformative model of emergence/demergence and its principal applicability to perceptual meaning, regardless of its different conceptions of a part-whole hierarchy:

PWO_{ind_emp_3}: A part-whole oscillation (PWO) is a perceptible process of two-sided part-whole dependency in which both parts and whole become perceptually meaningful during the more general processes of ontological emergence and ontological demergence.

7.4 Multistability and Reversing Hierarchies

7.4.1 Ambiguous Figure-Ground Phenomena

Let us approach the notions of part-whole multistability and part-whole reversibility by looking at figure-ground phenomena. Besides perceptual grouping and its cognitive conditions, the study of figure-ground phenomena is the second major and therefore extensively investigated subject in Gestalt theoretical research. What is the difference between grouping and figure-ground? “In general, grouping determines what the qualitative elements of perception are, and figure-ground determines the interpretation of those elements in terms of their shapes and relative locations in the layout of surfaces in the 3-D world.” [Wagemans 2012a: 9] We are all familiar with figure-ground phenomena in our daily perception of objects. If we stand in front of a house, for example, behind which there is a sky, then we see the house in the foreground as figure and the sky in the background as ground. Or, to give an example by Koffka,¹²⁰ in reading this text, the letters are the figure and the white sheet is the ground. Whereas the house and the letters are figures because their contours are clearly demarcated, the respective grounds continue behind the figures and we cannot grasp their borders in relation to the figure (of course, the white sheet can also function as a figure with clear-cut contours for the surface of the table on which it is placed, etc.). However, figure-ground relations are not always as distinct and definable as in these examples. It is precisely the potential ambiguity and multistability of figure-ground phenomena, i.e. the indeterminacy and reversibility of what functions as a stable figure and what as stable ground within one and the same percept, which is so fascinating about this topic.

The bidirectional relation between a distinguishable figure and the perceptually amorphous ground from which the figure in question stands out has already been artistically depicted already in Roman and Renaissance mosaics in order to create depth and ambiguity.¹²¹ But it was E. Rubin in his influential 1915 book *Synsoplevede Figurer. Studier i psykologisk Analyse* (*Visually perceived figures. Studies in psychological analysis*) who approached this empirical phenomenon for the first time in a theoretical manner. According to Rubin, there are objects

¹²⁰Cf. Koffka [1925: 556].

¹²¹Cf. Wade [2004; 2012: 336].

in perception, which are, *nota bene*, to be distinguished from how they objectively are,¹²² and which can be experienced as two or more different entities, depending on the determination of what functions as figure and what as ground.¹²³ Probably the most famous example given by Rubin is the vase-faces or goblet figure, in which we can either recognize two contoured faces on a white ground that continues behind the faces or a white vase on a black ground (Figure 7-4).

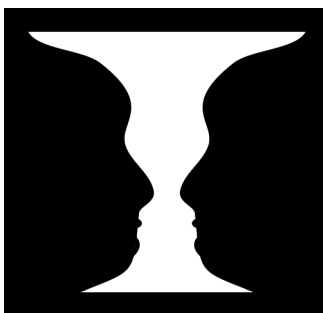


Figure 7-4: *Ambivalent Rubin Vase*¹²⁴

In this and similar examples, we can distinguish two levels of perception, which are, on the one hand, equally stable, but on the other hand exclude each other such that there is a perceptual ambiguity due to the occurrence of figure-ground reversals. A number of aspects have been studied that influence our perception and evaluation of figure and ground, among others – as listed in Wagemans et al. [2012a: 26–31] – the function of convexity, symmetry, lower region, top-bottom polarity, motion, past experience, and attention.¹²⁵ Such factors influence what it takes for an object to be perceived as a figure or as ground. Furthermore, it was shown that the phenomenon of multistable ambiguity is not restricted to the perception of two levels alone, but can create and reverse multiple levels of depth, for which many artworks serve as primary examples.¹²⁶ Other areas of research on figure-ground perception concern, for example, the shape of holes in figure-ground constellations,¹²⁷ the assignment of figure and ground to

¹²²“Obwohl z. B. die Kontur eines Quadrates vier Bestandstücke hat, braucht dieser Sachverhalt nicht am erlebten Gegenstand vorhanden zu sein, wenn das Quadrat als eine Flächenfigur erlebt wird; man muß sich überhaupt davor hüten, den erlebten Gegenständen all das zuzuschreiben, was man von den objektiven Gegenständen weiß.” [Rubin 1921: xi] Cf. also [id.: 43; 91 f.]. Here and in the following, I quote from and refer to the German translation of *Synsoplevede Figurer. Studier i psykologisk Analyse*, as an English translation is not (yet) available.

¹²³“[...] die erlebte Figur und der erlebte Grund [sind] zwei verschiedene erlebte Gegenstände [...], die unter verschiedenen Bedingungen durch ein und denselben objektiven Gegenstand hervorgebracht werden können.” [Rubin 1921: ix]

¹²⁴This figure is taken from <https://upload.wikimedia.org/wikipedia/commons/b/bd/Facevase.png> [last visited on 7 December 2019]. It can also be found in Rubin [1921: 249].

¹²⁵Cf. Barenholtz et al. [2006: 531] for another overview of literature on such factors that are constitutive for the determination of figure and ground, with special emphasis on figure-ground perception of animated shapes.

¹²⁶Cf. Arnheim [1974: 233] and Tsur [2000].

¹²⁷“By definition, holes are interior regions of objects or surfaces that that do not contain matter. In the cases of primary interest for figure/ground organization, the hole goes all the way through the object, so the background surface is visible through it [...]. The problems this raises for figure/ground perception concern the quasi-figural status of holes. They appear to be distinct phenomenological entities that have a shape of their own, even through they are actually just an empty space through which the background surface can be seen.” Palmer [1999: 286]. Cf. on this topic also Nelson et al. [2001] and Bertamini et al. [2012].

moving images with deforming contours,¹²⁸ or the application to the area of linguistic and cognitive patterns.¹²⁹

The particular interest in the figure-ground phenomenon for the present project has been triggered by the processes of backgrounding and foregrounding of part-whole relations in conceptual metonymy.¹³⁰ A closer inspection of conceptual metonymy revealed that by singling out one part of an experiential domain and by using it as metonymy in language, the whole domain or at least an experiential whole in the same domain is backgrounded, but always retrievable via an act of foregrounding. This is also the case when a whole is foregrounded and the single parts are backgrounded, e.g. when we say ‘Washington’, but actually mean the president of the US. Indeed, there is a noticeable difference between figure-ground reversals and metonymic part-whole reversals. The former usually concerns a one-to-one relation (perceptual object *A* of entity *AB* is seen as figure and *B* as ground, or vice versa) and the latter a one-to-many or a many-to-one relation (either the one whole or at least one if its parts are foregrounded/backgrounded). This is why the commonly studied factors that are constitutive of figure-ground segregation, such as convexity, symmetry, etc., are less informative for the perceptual reversals of parts and whole. The same holds true if we only look at the figure and its properties instead of looking at the properties of the dynamic relation *between* figure and ground.¹³¹ It is true that, although this relation is established prior to the crystallization of the figure, what we become aware of first in perception is often the organized figure with its grouped parts instead of the figure’s dependence relation with its ground.¹³²

What promises to be informative, however, is to look at the momentum of reversal itself, i.e. the dynamic and bidirectional relation of ambiguity between the interdependent poles. In a purely descriptive approach, it should be possible to develop the perceptual characteristics, which are the experienced qualities of figure-ground reversals as such, and to transfer them to part-whole reversals in order to further determine the ontological nature of PWO for the realm of empirical perception. In so doing, it should be possible to suggest an alternative model to

¹²⁸Cf. Barenholtz et al. [2006].

¹²⁹Cf. for example Thiering [2011], who relates the figure-ground structure to *spatial* semantics, and Johnson et al. [1999: 137–169], who argue that we mostly conceptualize and express *time* either as a moving figure with the observer as ground or the other way round, which is, of course, enabled by our embodiment of figure-ground perceptions on the experiential and sensorimotor domains. Cf. also Tsur [2000] on how figure-ground reversals create aesthetic effects in poetry and Wildgen [1995] on lexical and textual ambiguities, whereby both authors take a cognitive linguist stance by showing how abstract and referential language is a consequence of empirical perception. Ertel [1975] applies the figure-ground phenomenon, along with the Gestalt categories of centering and Michotte’s phenomenal causality, to the syntax and semantics of natural (German) language.

¹³⁰Cf. section 5.2 and the second positive characterization of PWO in ordinary language (PWO_{ind_lang_2}) in section 5.3.

¹³¹As Rausch [1966: 872] remarks, there is a tendency to concentrate on the figure and its parts and to neglect the ground and, more importantly, the relation between figure and ground. Then the figure’s properties are usually understood as typical principles of internal grouping and not as properties of relational ambiguity. “Die Frage nach dem Verhältnis von Eigenschaft und Relation [...] läßt sich - und zwar phänomenologisch und konditional-genetisch - auf das *Figur-Grund-Problem* ausdehnen. [...] Anscheinend kann auch das Duo von Figur und Grund sowohl in Form einer Relation (der Figur zum Grund) als auch in Form einer Eigenschaft - des Feldes bzw. der betreffenden Feldpartie - beschrieben werden. [...] Dabei ist ganz abgesehen davon, daß man dazu neigt, Attribute ausschließlich der Figur (oder ihren Teilen und Momenten) beizulegen. Denn dann handelt es sich ja um Eigenschaften, wie sie oben [...] gemeint waren und, besonders unter dem Namen ‘Gestalt- und Teileigenschaften’, weiter unten [...] noch ausführlich zu besprechen sein werden.”

¹³²Cf. Pinna [2011b: 384–5].

the irreversible hierarchical framework of the emergence and demergence of perceptual and, in consequence, metonymical part-whole structures. In other words, how does this special moment of reversal appear to the perceiver? What are the experiential effects such a process of Gestalt shifting causes in the perceiver? And how can multistable, reversible phenomena be applied to the generation of meaning in dynamic, interdependent part-whole structures?

For the description of these perceptual characteristics in which figure-ground reversals appear to us, it is promising to begin with Rubin's original text. Therein, he attributes to the perception of figure-ground reversals one important quality: a moment of surprise, surprise about a new perspective towards the perceptible world, or a new facet of objects the perceptible world opens up, even if we are familiar with the objects we look at.¹³³ This moment of surprise is not unjustified, because according to Rubin, figures entail a much higher degree both of form,¹³⁴ reality,¹³⁵ and perceptual meaning,¹³⁶ which is why a figure-ground reversal has the capacity to reveal or even create a previously unnoticed or even non-existent aspect of form, reality and meaning. All at once we recognize that one and the same arrangement of stimuli actually comprises two or more meaningful percepts. We could say that through the occurrence of a visual figure-ground reversal, the reality and the visual meaning of the experienced object becomes 'more' and richer than it had been prior to the reversal.¹³⁷ The moment of surprise is created because it does not fully lie in the power of our *attention* to make a figure switch into the ground or vice versa.¹³⁸ Rather more or less suddenly, the perceived world happens to be richer in meaning than it seemed beforehand.

Furthermore, the experience of this reversal is not reducible to the spatial perspective of

¹³³“Es ist mir sehr viele Male passiert, wenn ich eine sinnlose Figur betrachte und z. B. zuerst das eingeschlossene Feld als Figur und das umschließende als Grund erlebe, und mir dann vornehme, das umschließende Feld als Figur zu erleben, daß die erlebte Figur, die dann entsteht, mich völlig überrascht. Nicht nur, daß ich mir nicht vorgestellt habe, daß das Feld, als Figur erlebt, in allen Einzelheiten genau so wirken würde, sondern ich habe überhaupt keine Ahnung gehabt, wie es als Figur aussehen würde. [...] Es geschieht wiederholt, wenn ich mir Teppiche und ähnliche gemusterte Gegenstände ansehe, die ich Jahre hindurch vor Auge gehabt habe, und die ich gut kenne, daß das System von Feldern, das gewöhnlich Grund gewesen ist, sich als Figur oder Muster einfindet und überraschend neu anmutet.” [Rubin 1921: 31]. Cf. on this point in Rubin also Pind [2014: 95; 102].

¹³⁴Cf. id. [36].

¹³⁵Cf. id. [45].

¹³⁶Cf. id. [74].

¹³⁷“Es geschieht etwas mit dem Grunde, wenn er dazu übergeht, Figur zu werden; man hat hier, wo es langsam geht, in besonderem Grade den Eindruck, daß es etwas Neues ist, das zu dem Felde hinzukommt, welches Grund war, und nun dazu übergeht, Figur zu werden; der erlebte Gegenstand, der sich auf dieses Feld bezieht, wird, indem er gleichzeitig wechselt, bereichert. Dieser Eindruck wird aber auch deutlich, wo sich das Feld, welches früher Grund war, plötzlich als Figur einfindet.” [id.: 36]

¹³⁸“Vieles von dem, was man gewöhnlich der Aufmerksamkeit zuschreibt, wird hierdurch teils als Eigenschaft der erlebten Gegenstände, teils als gesetzmäßige Verbindung zwischen erlebten Gegenständen aufzufassen sein. Der Versuch, der gemacht worden ist, läuft also darauf hinaus, zu vermeiden, mit dem Begriff der Aufmerksamkeit und statt dessen mit dem Erlebten selbst zu arbeiten.” [id.: ix] After Rubin, the role of attention for figure-ground perception has been extensively studied. In contrast to Rubin, Leopold et al. [1999] for example accentuate the role of attention for the perception of ambiguous objects, whereas Koffka [1922: 562] observes “that the figure-ground distinction cannot be identified with a mere difference of the attention-level.” In their recent review of Gestalt research on this topic, Wagemans et al. [2012a: 31] come to the conclusion that “although figure-ground perception can be affected by focused attention, there is evidence that it can *also* occur preattentively.” For the purposes of the present project, the role of subjective attention and intention for figure-ground reversals is less relevant. I am rather interested in the fact that *there is* such a phenomenon, and, in particular, how the dynamic aspect of this phenomenon might be applied to *de*-hierarchize or better continually *re*-hierarchize a part-whole structure.

the observer, but is always dependent on the constitution of the experienced object itself. This becomes clear in the distinction between background and ground. Rubin explains that a background is always *spatially behind* the figure (e.g. the sky is *behind* the house¹³⁹), which is accordingly in the foreground, and if the observer were to move around the figure such that it disappears from their field of vision, then the background would turn into a figure. A background thus involves an objective difference in depth and its being a background depends on our spatial perspective and location. A ground, however, can be at the same level of depth as the figure and therefore does not change its function of ground merely by a relocation of our spatial point of view.¹⁴⁰ In Figure 7-4, for example, the faces and the goblet display an identical spatial depth. Also, Rubin goes on to argue, even if one object is spatially *behind* another one, it is possible to experience the rear object and not the front object as figure, for example when we cut a hole into a piece of cardboard and place it on another piece of cardboard with a different color. Then normally we perceive the detail of the latter as figure and the frame of the former as ground.¹⁴¹ Since the gerund *grounding* has a different connotation, I think we can use *backgrounding* for the turning into a *ground* (not into a background) of a figure without creating confusion.

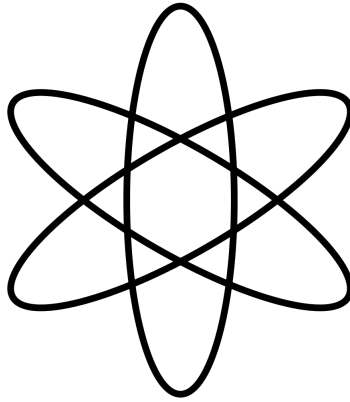


Figure 7-5: *Atom Symbol*¹⁴²

Understanding ‘ground’ in this way establishes the intended analogy between figure-ground reversals and PWO, because both refer to one and the same arrangement of stimuli (which, for example, in figure 7-4 is perceivable as a goblet *or* as faces), whereas the pair foreground-background would refer to two spatially different arrangements of stimuli (e.g. a sky *and* a house). Only the former involves perceptual ambiguity, which is, however, as Rubin states, not a strict and exclusive either/or relation, but rather an experiential state of perception in between either/or and both/and. Let me try to explain this using the example of the atom symbol [Figure 7-5]. The whole figure is an experiential object *O*, and it consists of three ovals *A*, *B*, and *C*. Each of these ovals can function as figure *f* or as ground *g*. This is the case in a 2-dimensional perception of *O* when one oval is, as *f*, in front of the other two, which are, as *g*,

¹³⁹Of course, the sky is objectively *above* the house. But if we direct our gaze to the contour of the house and judge from our visual awareness, then the sky appears as being behind it.

¹⁴⁰Cf. Rubin [1921: 4].

¹⁴¹Cf. [id.: 60].

¹⁴²This figure is reproduced from https://upload.wikimedia.org/wikipedia/commons/thumb/8/84/Popular_culture_atom_symbol.svg/906px-Popular_culture_atom_symbol.svg.png – last visited on 7 December 2019.

behind f . It is equally the case in a 3-dimensional perception when we see the ovals as circles of which one (f) surrounds the other two (g). In both cases, O is in a state of constant reversal, which means that A , B , and C constantly alternate in their function as figure and ground. But what is more, in the course of the reversals, each oval/circle still keeps something of its former and future character as f or g , even if, in the moment of perception, it is not f or g . Through carrying its ‘history’ and its ‘future’ as f or g with it into its now being g or f , each part slightly appears in a ‘not directly intuitive’ (*nicht direkt anschaulich*) manner as g although it clearly stands out as f , or as f although it is actually backgrounded.¹⁴³ Thus, as Pind [2014: 96] comments on this passage in Rubin, “it is possible that when a shape, which is experienced as figure, recedes and becomes ground, it may yet keep something of the characteristics of the figure.” Also, as Ehrenstein accentuates in this regard, we cannot but anticipate appearances of O that are, in the present moment, only implicitly given in perception.¹⁴⁴

Rubin also observes that the more often we switch either g into f or f into g , the clearer both of them stand out *simultaneously* as f .¹⁴⁵ Thus, “it may even happen that both areas of the stimulus are simultaneously experienced as figure.” [id.] This may have to do with the fact that, as Köhler [1940: 69] notices, “as the time of observation increases, the changes tend to follow each other more rapidly.” In the course of its constant state of reversing back and forth, the nature of O is thus not only permanently changing, but it also entails the conceptual paradoxes that f can somehow be experienced as being *in* g and vice versa and even that, after prolonged inspection of O , both A , B , and C can function as f at the same time. In the dynamic logic of figure-ground perception of an ambiguous object like Figure 7-5, but also figures 7-2, 7-3 and 7-4, a clear-cut binary division of g and f as separable entities is thus inapplicable. This is why these attributes of figure-ground reversals have to be distinguished from the more extensively studied reasons for why and how f stands out as f compared to g , because to determine the latter, we have to ‘freeze’ the actual motion involved in the intertwining (of the) moments of O . In a figure like 7-5, we thus not only deal with several different percepts that *exclude* each other, but also with percepts that somehow transcend their visible nature as f or g by implicitly yet noticeably *including* aspects of their complementary co-percept g or f . Analogously, and this is the connecting factor I want to stress, in PWO we encounter the same logical incoherence that

¹⁴³“Zweitens kann es mitunter störend wirken, daß es nicht völlig gelingt, das Feld, welches vorher Figur war, als Grund zu erleben; es behält zu einem gewissen Grade den Figurcharakter bei. Es kann außerdem ein nicht direkt anschaulich gegebenes Wissen darüber vorhanden sein, wie das Feld als Figur aussieht, ein Wissen, welches nicht leicht von dem direkt anschaulich Gegebenen auseinanderzuhalten ist; aber selbst hier, wo somit bei dem Übergang zwischen dem, was man in bezug auf das Feld, welches zuerst Figur war und darauf als Grund erlebt werden soll, der Unterschied gering erscheinen mag, wird bei dem anderen Feld, wo der Uebergang in entgegengesetzter Richtung vor sich geht, der Unterschied ansehnlicher sein.” [id.: 33]

¹⁴⁴“Das Vorstellungsvermögen, das die Vorwegnahme späterer Figurinhalte der Wahrnehmung ermöglicht, ist eine letzte, nicht weiter zurückführbare, so hinzunehmende Grundtatsache unseres Seins.” [Ehrenstein 1954: 323]

¹⁴⁵“Wenn man dagegen, um sich sein Urteil recht klar zu machen, mehrere Male zwischen der einen und der anderen Art, die vorliegende Figur aufzufassen hin und her geht, kann dies dahin führen, daß das umschlossene und das umschließende Feld allmählich simultan oder ungefähr simultan und ungefähr in gleich hohem Grade als Figur hervortreten; dies ist eine Folge davon, daß man solange mit der Figur gearbeitet hat, und besagt, daß man jetzt mit anderen erlebten Gegenständen als ursprünglich zu tun hat. Man muß es sich hier klarmachen, daß das neue Urteil, zu dem man eventuell kommt, das Urteil, zu dem man zuerst kam, als man sich mit der Figur zu arbeiten anschickte, nicht aufhebt, denn die beiden Urteile beziehen sich auf verschiedene erlebte Gegenstände.” [Rubin 1921: 33]

the whole is both distinguishable from and comprised in one or more of its parts.¹⁴⁶ The nature of such intertwined relations can be described as a kind of ontological ‘glitch’ in perception, a glitch that is indeterminable when the bidirectional process of oscillating is made static in order to analyze the properties of one side and compare them to the properties of the other.

Whereas in the course of reversing, figure and ground are distinguishable yet incomparable because they are in a constant process of switching, which results in two or more different and alternating percepts, we can indeed compare figure and ground when the process of reversing is inactive or when the nature of the experienced object is not or hardly ambiguous. Then it is possible to determine the particular character of a figure and the particular character of a ground on the basis of their difference,¹⁴⁷ and definitions of the figure-ground phenomenon such as the recent one given by Peterson [2015: 259] are to the point: “When two regions of the visual input share a border, visual processes determine whether one of them has a definite shape bounded by the shared border. In this case, the shaped region is perceived as the figure (the object) and the border is perceived as its bounding contour. The region on the opposite side of the border appears to simply continue behind the figure/object; it is perceived as a shapeless *ground* to the figure/object at their shared border.” This definition states that in comparison to the shaped and bordered figure, the ground appears as shapeless and boundless. These are, however, not the only characteristics of figure and ground in their mode of being (temporarily) irreversible. Already Rubin himself discusses several other characteristics, which Spillmann [2012: 194] summarizes as follows:

“According to Rubin [...], figures are characterized as follows: They have object character (represent a thing), adhere or cling together (are compact), appear closer to the observer (even on a two-dimensional surface), are surrounded by a contour (that is unilateral), possess a form (often convex and symmetrical), and are superimposed onto a background, which they partially occlude. In comparison, the ground or background has a ‘loose’ structure (Rubin’s ‘substance’); it appears further away than the figure, is partially occluded by the figure and continues behind it; it is shapeless (e.g., the sky between the clouds) and larger than the figure. The figure is perceptually richer than the ground, has a bounded surface, and evokes connotations, whereas the ground is space-filling, poorly presented in awareness, and often not remembered. Figures represent objects with which we interact while the ground is ‘stuff.’ The distinction between figure and ground is not given in the physical stimulus; it is an achievement of the brain. In order for us to perceive figures, stimuli need to differ in brightness, color, texture, depth, or motion from their surround.”¹⁴⁸

This is one way to approach the figure-ground phenomenon: to determine what distinguishes figure and ground. Mostly, this involves a hierarchy in which the figure is, analogous to the

¹⁴⁶Cf. subsections 2.2.7 and 4.3.2.

¹⁴⁷Koffka [1922: 566], for example, states that there is an “essential difference between the figure and ground phenomena. This difference is fundamental and the figure-ground structure must therefore be considered one of the most primitive of all structures.”

¹⁴⁸Cf. Pind [2014: 90–109] for a more in-depth discussion of these characteristics in Rubin’s original analysis of the figure-ground phenomenon.

traditional conception of Gestalt as perceptible whole,¹⁴⁹ superior to and thus higher than the ground. Even if the insight emerges that figure and ground are actually interdependent, in many cases the ground then only *serves* as a replaceable and characterless bottom *for* the perceptually superior figure to appear, like the many are supposed to do for the One in a one-sidedly dependent part-whole structure. Koffka [1922: 566–7] writes in this respect that although there is a “superiority of the figure-phenomenon over the ground-phenomenon [...], the ground has a very important function of its own; it serves as a general level (*niveau*) upon which the figure appears. Now figure and ground form a structure, consequently the former cannot be independent of the latter.” The superiority of the figure in such a hierarchical figure-ground relation consists in the ground’s exclusion from perceptual meaning, which is only assigned to what appears as figure. Only after the figure is imbued with meaning, or only after meaning emerges from the figure but not from the ground, do we relate the figure to its ground and analyze the latter’s determining influence on the former. As Škilters [2011: 285] recently describes it: “What happens when we assign meaning during perceptual processing? We build structures in that we segment the perceptual material we are confronted with: we select certain important/determining parts (referred to as *figures*) from those supporting/backgrounding (referred to as *grounds*) the important/determining ones. [...] As soon as we assign meaning to something, we generate functional dependencies.” But this is not the kind of hierarchy I seek, because it assigns meaning only to what stands higher in the hierarchy (here: the figure, above: the whole) instead of to the ontogenesis and reversibility of the hierarchy itself. In lieu of analytically discriminating figure and ground by concentrating on their unambiguous and stable appearances within a field of perception, however, we can also try to get a better idea of their intertwined and dynamic nature in ambiguous patterns and to suggest from there an alternative kind of meaning-generating hierarchy that is valid for ambiguous part-whole relations (PWO) as well. It has to be added that such a ‘letting-go’ of the static state in which figure and ground are clearly specifiable involves a conceptual challenge, because – as Arnheim [2004: 286–7] in this context expresses it in only slightly exaggerated terms – it necessitates a higher complexity in which we perceive and therefore conceive the world: “Great pleasure goes with this animation of a formerly static concept. But the change to a model of higher complexity also arouses apprehension. The neat circumscription of objects – expressed in drawings by a determined contour line – must be abandoned, and the timeless stability of concepts, cherished by the thinker, no longer has its counterpart in the world these concepts describe.”

7.4.2 Rethinking Multistability: Towards an Interactive Realism

To do so, we have to rethink three major assumptions which are held to be fundamental for the figure-ground phenomenon. The first assumption concerns the just-discussed interdependence of figure and ground. On the one hand, we can think of this interdependence in the standard way by classifying the ground as a cause for the figure to appear, and the figure subsequently as a cause for the ground to – in a certain sense – disappear. Such a causal interdependence would establish a hierarchy in which the figure, although or because it is caused by the ground, stands higher through its being the only meaningful and the more determinative side. On the other hand, we could classify the figure-ground interdependence as reciprocal from the outset.

¹⁴⁹Cf. section 6.3.

Instead of a causal chain in which the downward causation by the figure that has emerged from the already existing ground takes place *after* the upward causation of the figure by the ground, we can understand figure-ground interdependence as a reciprocal causation. In a reciprocal causation, there is not a succession in which *A* causes *B* and *B* in turn causes (in the sense of *determines* the nature of) *A*, but a simultaneity in which *A* and *B* cause and are the effect of each other without one doing it first and the other following.¹⁵⁰

In such a reciprocally causal relation, it would be implausible to attribute meaning only to one side, viz. the figure, where it is in fact the synchronous interaction of both sides which is meaningful and which thus distributes meaning to *A* and *B* alike. In this alternative to the standard view, meaning would thus be inherent to and therefore accessible in both figure and ground and be perceived as such, which has also been confirmed in a recent experiment by Peterson et al. on the cognitive processing of non-ambiguous figure-ground phenomena.¹⁵¹ What is valid in this regard for non-ambiguous patterns should be even more applicable in the case of reversible figures. Furthermore, this result of rethinking figure-ground interdependence as reciprocal causation corresponds better with Rubin's insight that, in figure-ground reversals, a figure that was a ground before or a ground that was a figure still keeps something of its previous character. In being simultaneously an effect of its opposite side and its cause, a figure/ground is more closely connected to, i.e. more intertwined with its opposite side than in just being either its effect or its cause. I see no reason why this reciprocal causation should not be valid for perceptible part-whole relations as well, since we have seen that the splitting or analyzing into parts reveals the perceptual meanings of such a structure no less than the merging or synthesizing into its rather holistic aspects.

The second assumption to rethink is related to the nature of the stimulus giving rise to ambiguous perceptions. It is often said that when we deal with ambiguous figure-ground phenomena, then we have one self-identical arrangement of stimuli (for instance three 2-dimensional ovals within a circle in Figure 7-5). This means that there is one stable and in itself 'meaningless' stimulus pattern which is perceptible in two or more different meaningful ways. As Attneave [1971: 63] puts it, "[w]hen we look steadily at a picture or a geometric figure, the information received by the retina of the eye is relatively constant and what the brain perceives usually does not change. If the figure we are perceiving happens to be an ambiguous figure, what the brain perceives may change swiftly without any change in the message it is perceiving from the eye. [...] An ambiguous figure provides the viewer with an input for which there

¹⁵⁰Cf. Revilla [2014: 5408] on the idea of reciprocal causation.

¹⁵¹The authors summarize their experiment as follows: "Figure-ground perception entails inhibitory competition between potential objects suggested on opposite sides of a border. The winner is perceived as the figure; the loser is suppressed and perceived as a shapeless ground. We investigated whether the meaning of an object that ultimately loses the competition for figural status is activated prior to figure assignment, and, if so, whether it is suppressed. Participants categorized words as naming natural or artificial objects. The words followed novel silhouettes with portions of real-world objects suggested along the outside of their vertical borders. The silhouettes were designed so that the inside would be seen as the figure, the outside would be seen as a shapeless ground, and participants would be unaware of the real-world objects that lost the competition for figural status. Participants categorized words faster when the real-world object suggested on the groundside of the preceding silhouette was from the same versus a different category. Thus, the meaning of real-world objects that are suggested in the visual input, but are not ultimately perceived, is accessed (but not suppressed) in the course of perceptual organization. Our results show that meaning is not secondary in perception as in the traditional Gestalt view and in current feedforward models. Instead, it can be said to be primary in that it seems to be accessed in the first pass of processing." [Peterson et al. 2012: 309–10]

are two or more possible representations that are quite different and about equally good, by whatever criteria the perceptual system employs.” To determine a stimulus s as ambiguous then implies that whereas it is itself homogeneous, it allows for a heterogeneity of perceptions p_{1-n} , which are possible representations of the stimulus pattern in the brain:

$$\begin{array}{ccc}
 & & p_1 \\
 & \nearrow & \\
 s = s & \longrightarrow & p_2 \\
 & \searrow & \\
 & & p_n
 \end{array}$$

This is what it means to speak of multistability in perception: an in itself unchanging, i.e. stable stimulus s is perceived or cognitively represented as giving rise to a multiplicity of realizations (p_1, p_2, p_n). In an ambiguous figure-ground phenomenon, the perceptions might change, but the stimulus stays stable. Accordingly, Stadler et al. [1994: 222] claim that “[t]he characteristic properties of these patterns are that there is a constant stimulus giving the possibility to attribute various meanings to the related perceptual structure.” This means that there is a “stability-instability transition” [id.] from stimulus to percept(s). In a non-ambiguous figure-ground phenomenon, there is also only one stable percept corresponding to one stable stimulus pattern. Thus in both ambiguous and non-ambiguous figure-ground phenomena, the stimulus pattern is regarded as self-identical and as what may be called ‘uni-stable’, with the consequence that the actual meaning of what is perceived is only attributed to the percept *after* it has been cognitively formed. Put simply, the external world of stimuli is always stable and devoid of perceptual meaning, whereas the perceived world can be multistable and is attributable with perceptual meanings. Such a position would enable, for example, what Stadler et al. defend in this context as a ‘radical constructivistic view’ of meaning.¹⁵² This position seems to be shared by Koenderink [2015a: 46] as well, for whom “[t]he phenomenon of figure-ground reversal proves that this is a purely mental phenomenon, there being no physics of the matter.” However, what would the alternative to such a meaning-constructivism look like for the case of ambiguous figure-ground phenomena? Would it not be possible to locate meaningful multistability already in the domain of the stimulus itself such that the relevant aspects of the external world not only appear as multistable when perceived, but already contain in themselves the simultaneity of s as consisting of $s_1 + s_2 + s_n$, of which we can perceive $p_1 / p_2 / p_n$ only in succession?

$$\begin{array}{ccc}
 & & p_1 \\
 & \nearrow & \\
 s = s_1 + s_2 + s_n & \longrightarrow & p_2 \\
 & \searrow & \\
 & & p_n
 \end{array}$$

Such an alternative would have the not only philosophically important advantage of avoiding a strict dualism between ‘meaningless’ stimulus and ‘meaningful’ perception, which in the end

¹⁵²“This philosophical approach claims that no semantic information enters the brain or the cognitive system from the outside. From that it follows that meaning must be created in the system itself by self-reference. Therefore it is not possible to refer from cognitive objects to real objects. Real objects surely are the cause of certain stimulus patterns for the sensory systems, but these patterns are, as we have argued, always ambiguous. So the external stimulus patterns are only boundary conditions that stimulate the self-organizing activity of the brain.” [Stadler et al. 1995: 12–3]

amounts to nothing but a Cartesian dualism between world and mind. The rejection of such a dualism would, for example, solve the mystery of Benussi's 'process x ' that connects a constant complex of stimuli and the multiple perceptions of it.¹⁵³ This alternative would also justify the phenomenological experience that our different perceptions of an ambiguous object O as such or such does not exhaust the ways in which O can be perceived due to our cognitive limitations, but keeps open a perhaps inexhaustible range of possibilities in which O could also be identified as meaningful. Furthermore, with this alternative it would be possible to build on Köhler's hypotheses concerning the existence of figure-ground relations in the pre-perceptual, physical and chemical levels of reality.¹⁵⁴ Whereas in the classical view, the possibilities of perception exceed what is given as stimulus, in this alternative view it is rather the other way round: Perceived meanings might be just a fraction of the totality of perceptible (and perhaps imperceptible) meanings. Hence what Rubin discovers as a moment of 'surprise' that sets in when an ambiguous object suddenly reverses is easier to explain, because we can only be surprised when something that is external to us shows itself in a new light, not by a switch in what has already been cognitively processed and is thus internal. Furthermore, by assuming that multiple meanings are inherent in the stimulus, our varying interpretations of the stimulus would have a justified foundation that precludes arbitrariness ('because O is ambiguous, it has no meaning in itself and thus can mean *anything*') yet allows for plurivalent interpretations ('because O is ambiguous, it has certain meanings and thus more than one but not *any* interpretation of it is valid').¹⁵⁵ All in all, this alternative to the standard stimulus-percept relationship in ambiguous figure-ground phenomena calls for a certain realism and pluralism of perceptual meanings as being external yet (partly) perceptible in the first place.

The range of phenomena to which such a realism applies would be insignificantly small, however, if it only concerned ambiguous figure-ground phenomena. In order to suggest an appropriate kind of realism of multistability, it is therefore necessary to extend the range of the latter and to locate it beyond figure-ground relations. This question about the scope of reversibility is the third aspect which I suggest rethinking, because if perceptible ambiguity

¹⁵³Da bei einem *konstanten* Komplexe von Sinneseindrücken Vorstellungen von ganz *verschiedenen* Gegenständen erweckt werden können, und zwar in der Art, daß diese Gegenstände nicht durch Assoziationen und auch nicht durch anschauungsfreie Gedanken an Verhältnisse oder Sachverhältnisse, sondern durch direkte Anschauung uns vorgehalten werden, so ist es klar, daß diese Vorstellungen keineswegs in der Weise durch die Tätigkeit eines Sinnesorganes veranlaßt werden können, wie durch eine Netzhautreizung bestimmter Art die Vorstellung einer bestimmten Farbe hervorgerufen wird. Die Leistungsfähigkeit der Sinne reicht nicht so weit. Es muß also zwischen den Sinneseindrücken, die konstant bleiben, und den Vorstellungen von Figuren, welche voneinander verschieden ausfallen können, noch ein Vorgang x seinen Platz finden, der, je nachdem er sich so oder so abspielt, unter und *trotz* der Voraussetzung einander gleicher, konstanter Sinneseindrücke zu Vorstellungen von ganz verschiedenen Gegenständen führt." [Benussi 2002: 345]

¹⁵⁴Cf. on this point Ley [1996: 202]: "So entwickelt Köhler für den einfachen Fall eines Figur-Grund-Verhältnisses, wie es etwa bei der Wahrnehmung eines weißen Kreises auf grauem Grund gegeben ist, ein hypothetisches Modell, nach dem die Ionenkonzentration in den Sinneszellen der Netzhaut bereits selbst nach Figur-Grund-Prinzipien organisiert sein könnte. Geht man in diesem Fall nämlich davon aus, daß diese Ionenkonzentration nach Maßgabe der Reizvorlage für größere Gebiete der Sinnesfläche jeweils höhere bzw. niedrigere Werte annimmt, dann ließe sich zwischen den Bereichen höherer und niedrigerer Konzentration ein charakteristisches Spannungsgefälle, ein 'Potentialsprung' verzeichnen, der genau mit der wahrgenommenen Grenze zwischen Figur und Grund zusammenfallen muß: Jeder Kontur im Wahrnehmungsfeld entspricht ein Potentialsprung in der Nervensubstanz."

¹⁵⁵This argument is derived from Piccolino et al.'s [2006a: 861] characterization of ambiguity: "Perceptual ambiguity refers to the alternation over time between differing interpretations of a pattern."

were to be restricted to a certain kind of figure-ground relation alone, then it would certainly be unjustified to apply the dynamic hierarchy inherent to reversible structures to interdependent part-whole relations. Of course, it has always been unquestionable that the phenomenon of reversibility comprises not only abstract or figurative images in which there are shifts from figure into ground and vice versa. Perceptual ambiguity has also been attributed to figurative as well as abstract images such as the often used examples of the Necker cube (Figure 7-2 above), ‘Duck-Rabbit’ (Figure 7-3 above), or ‘My Wife and My Mother-in-Law’ (Figure 7-6 below). In such reversible images, we can perceive one of at least two perceptual meanings or geometrical perspectives offered by the respective arrangement of stimuli, without there being a figure-ground switch.¹⁵⁶



Figure 7-6: *My Wife and My Mother-in-Law*¹⁵⁷

If rather artistically and artificially created, illusory images like these were the only instances in which ambiguous objects occur, however, then Attneave [1971: 64] would be right in stating that “[u]nder normal conditions many factors cooperate to determine the figure-ground relationship, and ambiguity is rare.” In the same vein, Kanizsa et al. [1995: 48] argue that the peculiarity of reversible figures “lies in the fact that they are very rare in ordinary everyday perception. One could claim that they are not to be found in nature, but this would be inaccurate: The very moment they enter an observer’s visual field they gain full status of visual objects. The frequency of this event occurring is irrelevant.” For Metzger [2006: 13], this rare frequency is even relevant, because, as he sees it, “[p]eople who are particularly sensitive can be driven crazy by such reversible figures. Fortunately for our peace of mind, reversible patterns rarely occur in natural environments.” As rare examples, he refers to zebras and “carpet, tile, or wallpaper patterns that drive you crazy [...]” [id.] Furthermore, since the unequivocal stability of a percept/a figure hinges on its being determined by Gestalt laws of grouping,¹⁵⁸ above all the principle of *Prägnanz*, and since most Gestalt theorists seem to base their hypotheses on the observation that “there is a lawful *tendency to stability* in the perceptual field” [Luccio 2003: 377], it is no surprise that perceptual ambiguity seems to occur only in rare cases. All of this suggests that – even if reversible images are classifiable into several kinds¹⁵⁹ and even if the

¹⁵⁶“Some ambiguous shapes do not involve a reversal of figure and ground. Consequently, the part boundaries defined by minima of curvature do not move when these figures change interpretations.” [Hoffman et al. 1984: 83]

¹⁵⁷Reproduced from https://upload.wikimedia.org/wikipedia/commons/5/5f/My_Wife_and_My_Mother-In-Law_%28Hill%29.svg – last visited on 7 December 2019.

¹⁵⁸“If none of the Gestalt laws is decisive [...], the figure vacillates back and forth [...] and never comes to rest.” [Metzger 2006: 13].

¹⁵⁹Stadler et al. [1995: 7–6], for example, differentiate seven types of ambiguous patterns in perception, including

phenomenon of reversibility can also be discovered in the acoustical sphere¹⁶⁰ – the factual rarity of this phenomenon seems to make it ineligible for a transformation of its dynamic processuality into the more capacious ontological region of interdependent part-whole relations.

On the other hand, for some scholars the phenomenon of multistability is less rare than one might assume by concentrating only on well-known visual illusions and ambiguous figure-ground phenomena. On the contrary, as Stadler et al. [1995: 6] indicate, “[m]ultistability is a phenomenon that exists on all levels of matter and organization.” To illustrate this, the authors list examples from fields as diverse as physics (Bénard instability, optical bistability), chemistry (bistable molecules), biology (changes of stable states in brain processes), animal and human thinking (restructuring in problem-solving), language (multiple meanings of words and sentences), social processes (predominance of animal species) and developments (social revolutions), as well as scientific progress (Kuhnian paradigm shifts). To this we can also add, with Abrantes, the high level of interpretative ambiguity inherent to artworks.¹⁶¹ Such an extension of the range to which multistability applies would credit this phenomenon with a certain universality that reaches way beyond special and rare instances of human perception. If we just consider concrete cases in which there are alternations between stable states, mediated by processes of destabilization as restabilization, then indeed it becomes plausible that the phenomenon of multistability is more or less omnipresent, even in everyday situations. There are, for example, multiple stable states due to occurring reversals (temporary instabilities) in partnerships, career plans, faith, emotions, moods, health, opinions, knowledge, perspectives on events in life, etc. Not everything is possible for everybody in these areas, but for every person and within each of these exemplary domains, there is a finite amount of stable and approximately equally meaningful states that can, and in fact do, alternate, sometimes unexpectedly and often revealing unforeseen aspects.

Furthermore, it can be argued that even within the comparably smaller domain of empirical perception, we constantly deal with ambiguities which are, however, often overlooked by the fact that we seem to perceive a stable world governed by Gestalt laws of order and stability. Zimmer [1995: 99] states accordingly that “multistability is not confined to experimental settings but a pervasive, albeit inconspicuous phenomenon also in complex scenes and events.” He justifies this claim by arguing that there are principally two complementary processes in perception: “that of stability and its tendency towards simple forms [...] and that of singularity which specifies uniquely the position of the viewer relative to the perceived objects.” [id.: 102] To use an example of my own, when we perceive an imperfect geometrical form, for example a book with slightly rounded corners the shape of which is therefore *almost* a cuboid, then the tendency towards stability lets us perceive a perfectly cuboid-shaped book with orthogonal

‘fluctuations of complex patterns’ (e.g. Figure 7-5), ‘figure-ground tristability’, ‘multistability of symmetry axes’, ‘multistability of 2-dimensional projections of 3-dimensional bodies’ (e.g. the Necker cube in Figure 7-2), ‘Multistability of actually 3-dimensional objects’, ‘Multistability of motion direction in apparent movement’, and ‘Multistability of meaning attribution’ (e.g. ‘Duck-Rabbit’ in Figure 7-3 and ‘Old-Young Woman’ in Figure 7-6).

¹⁶⁰Cf. [id.: 8].

¹⁶¹“One further aspect that contributes to the slower mode of aesthetic perception is the high degree of ambiguity that pertains to artistic works. Ambiguity in art is not so much the vagueness or uncertainty about what is represented, as it is the coexistence of various possibilities within one representation. Ambiguity is perhaps best conveyed by abstract forms, but it can also be achieved by subtle manipulations at the level of gestalt perception, such as figure and ground shifts.” [Abrantes 2008: 185]

corners (*Prägnanztendenz*). The tendency of singularity, however, has a strong influence on this stable perception, because it takes the perspective of the observer into account. Depending on the singular perspective, the book can take several equally stable shapes: if it lies in front of me on the table, it might indeed appear as stable in the sense of cuboid-shaped, but if I only see its surface (the cover), then I perceive a stable 2-dimensional rectangle, and if I take it in my hands and look straight at a corner such that the cover and the back cover are out of sight, then I see the book as an irregular hexagon. All of these percepts are stable, but they are also singular because of the unique perspective in which they are seen. Having more than one perspective, which is the general case in everyday perception and which results precisely from perceiving the relationship between perceived and perceiver as contingent, thus implies that objects can appear as multistable and thus imbued with multiple perceptual meanings. Conversely, if – unlike for instance in a Cubist painting – only one perspective with one single vanishing point is possible, then the amount of perceptual meanings is comparably diminished. For example, “in 2-dimensional drawings the strength of the spatial impression is not maximal for drawings that obey perfectly the rules of perspective but for those which form a compromise between stability of partial forms and perspective distortions.” [Zimmer 1991: 277–8]

What these examples and the complementarity of the tendencies towards stability and singularity amount to is neither a simple naive realism of perceptible meanings, nor an idealistic stance according to which perceptible meanings only arise and exist in our brains. Instead, Zimmer offers the interesting alternative of an ‘Interactive Realism’, which strongly resembles Johnson’s epistemological and implicitly also ontological framework of an ‘Embodied Realism’ according to which the basic structures of language and abstract thinking are derivable from our embodied being in the world.¹⁶² After having observed the effect of multiple perspectives on the interpretations of paintings, Zimmer concludes that “[t]he analysis of multistability so far supports the theoretical position that in space perception bottom-up and top-down processes interact.” This means that Interactive Realism could indeed form a basis for classifying the phenomenon of multistability as an indicator that leads us beyond a strict subject-object or brain-environment division. On the one hand, it presupposes a fundamental indeterminacy of reality such that multiple meanings are actualizable for a *prima facie* self-identical stimulus configuration. On the other hand, it is only in intentionally interacting with the external world that one or more meanings indeed become actualized and therefore come into existence, as a change of sign from real latency to real actuality. In other words, the active and reflected-upon perspective in which we approach (something in) reality presupposes the existence of (something in) reality, but it is only through this interaction that we discover and thus activate or ‘realize’ latent aspects of reality which we had not presupposed because we were not aware of them.¹⁶³

What is more and what I find innovative about this stance is that it is exactly this multiple

¹⁶²Cf. section 4.1.

¹⁶³In another, German article, Zimmer [2011: 38] explains this as follows: “Wie in den meisten Wahrnehmungstheorien explizit oder implizit postuliert wird, befähigt Wahrnehmung den Wahrnehmenden in der Wirklichkeit zu handeln. Damit aber dieses Handeln erfolgreich ist, müssen ihm Erwartungen vorausgegangen sein, wie denn die Wirklichkeit sein wird, wenn in sie handelnd eingegriffen worden ist. Diese Erwartungen oder Hypothesen können aber auch durchaus dazu verwendet werden, um durch Handeln neue Erkenntnisse über die Wirklichkeit zu erhalten. Dies ist nichts anderes als die experimentelle Methodik der Naturwissenschaft, die sich aber auch im täglichen Leben findet.”

actualization of perceptible meanings via their being perceived which is an act belonging to and being constitutive for reality itself. As Zimmer [1995: 109] sees it, “[m]ultistability can be regarded as a paradigmatic approach to the question how the order in the phenomenal world is related to that of the physical world and by doing this, one arrives at a position which might be termed Interactive Realism; a position claiming that for the perceiver the order of the world which is in the mind is a constituting element of this world itself.” The interdependencies inherent to ambiguous figure-ground phenomena and other seemingly illusory visual structures are thus mirrored in a realist position that postulates an interdependency between perceptible reality and perceiving subject. Whereas the latter’s reflection on the contingent singularity of its perspective and its intentionality towards the external world establishes perceptual meanings, which more often than not are multiply realizable, “the perceptual mechanisms also have evolved under the constraints of the physical world.” [id.: 110] Such constraints open up, analogous to the finite number of image schemata in Johnson,¹⁶⁴ an internally indeterminate yet externally limited domain of perceptible meanings for every stimulus configuration. Thus while there are mostly multiple, more or less equally stable meanings, these meanings are neither arbitrary nor endless.¹⁶⁵ What Zimmer’s Interactive Realism entails is therefore, in my opinion, an epistemological as well as ontological rethinking of the process on which multistable, perceptible meanings rely: a process which is broader in scope than standard reductions of ambiguity to rare instances, because it is anchored in our interactions with the world around us and the (in my opinion not necessarily self-identical) stimulus parts/wholes it offers. It is an Interactive Realism of this kind which seems to provide, given the similar position of Johnson’s Embodied Realism that could account for the development of the PART-WHOLE image schema¹⁶⁶ and consequently for PWO’s identification as conceptual metonymy,¹⁶⁷ a plausible framework in which perceptually meaningful, interdependent part-whole structures are implementable in the same fashion as other multistable phenomena have already been.

On the acceptance of such an Interactive Realism based on multistability in perception, which Zimmer unfortunately only delineates in general lines, we can thus, in turn, base a part-whole multistability together with the dynamic hierarchy such a structure implicates. The only additional step to do so is to relate the interdependent part-whole structure to the equally interdependent figure-ground structure and to identify the ambiguity of the latter in the nature of the former. As a result, it is not only possible to state that in PWO, a whole can either function as the figure when the parts are backgrounded or as the ground when one or more of its parts are foregrounded; it is also possible both to subsume this bidirectional process of backgrounding and foregrounding under the now more universal and reality-oriented category of multistability and therefore to apply the experiential moments attributed to multistability to PWO as well. These experiential moments could then reveal or at least hint at a kind of dynamic and reversible hierarchy the indetermination of which corresponds to the merely relative and

¹⁶⁴Cf. subsection 5.1.1.

¹⁶⁵“This indeterminacy in the relation between the physical world and the mental representation with its intentionality does not imply an anything[-]goes stance because in the cases of multistability usually only [a] small number of attractors exist [which], however, is principally unpredictable is the exact basin in which stability will be reached. That is, the physical world constrains but does not determine the actuality of the mind.” [Zimmer 1995: 135]

¹⁶⁶Cf. subsection 5.1.2.

¹⁶⁷Cf. section 5.3.

temporal yet not absolute primacy of either part(s) or whole. Apart from Rubin's experiential moment of 'surprise', which he observes to take place in figure-ground reversals,¹⁶⁸ we can add with Ehrenstein at least three additional experiences effectuated by alternations of stability.

Firstly and overlapping with Koenderink's notion of 'visual awareness'¹⁶⁹ as well as with Rubin's remarks on the intertwinement of figure and ground,¹⁷⁰ Ehrenstein claims that in our *consciousness* of a figure, the ground is always given as well, and vice versa, because both sides are inseparable and tend towards each other.¹⁷¹ He calls this a 'reciprocity of consciousness' that is defined by the awareness both of the difference between figure and ground and by its fundamental belonging-together.¹⁷² In a recent article, Hoffman [2016: 160] explicates what Ehrenstein calls 'reciprocity of consciousness' via the example of the Necker cube (Figure 7-2), which has two fore-/backgroundable sides, say *A* and *B*: "If, when you look, you see face *A* in front, then you know with a probability of one that *B* is behind, and vice versa. In other words, the states of the faces are entangled: Knowing the state of one face determines the state of the other. Thus, in the Necker cube, we have a model of superposition and entanglement in a macroscopic perception." This is the same logical paradox yet perceptible multifariousness that we discovered firstly in the case of conceptual metonymy and then in more detail as perceptual meaning and splitting/merging: A perceptible object *is and can therefore appear as* one (as figure; as whole; as one part) and many (as figure + ground; as whole + parts; as one part + other parts and/or whole) at the same time without contradiction, but instead even imbued with unforeseen perceptual meanings.

Secondly, Ehrenstein explains that reversible phenomena are capable of being differentiated according to their degree of 'reversibility'. The higher their degree of reversibility, the stronger is their 'pressure of reversing' (*Reversionsdruck*) in both directions on the observer.¹⁷³ A lesser degree of reversibility would yield a less strong, perhaps even an only one-directional pressure of reversing, such that – like in the example of a face drawn on a white ground¹⁷⁴ – only one aspect – the face – is, and typically remains, in the foreground as a figure. Similarly to an interdependent part-whole structure, there are different intensities of what we perceive as foregrounded. Whereas, for example, in entering a Protestant church one would rather experience the building and the interior design as a whole due to a lack of decorative elements, a Catholic church usually offers more details such that many parts of it stand out with more

¹⁶⁸Cf. Rubin [1921: 31] and subsection 7.4.1.

¹⁶⁹Cf. section 7.2.

¹⁷⁰Cf. subsection 7.4.1.

¹⁷¹"Es gibt in Wirklichkeit keine Figuren für sich und keine Gründe für sich, sondern nur bestimmte Figur-Grund-Zueinander, in denen Figur und Grund in engster wechselseitiger Abhängigkeit verbunden sind." [Ehrenstein 1954: 319]

¹⁷²"Figur und Grund sind voneinander abhängig und stehen zueinander in einem Verhältnis, das wir als Reziprozität der Bewußtheit benennen können. Keine Figur, deren Bewußtheitsstufe nicht mitbestimmt würde durch die Bewußtheitsstufe des Grundes, kein Grund, der so wäre, wie er ist unabhängig von den Eigenschaften und der Ausgeprägtheit der Figur. Je stärker die Figur im Bewußtsein hervortritt, desto mehr tritt der Grund zurück und umgekehrt. Die Figur-Grund-Differenzierung bedeutet in phänomenaler Hinsicht Scheidung (Differenzierung) und in funktionaler Hinsicht Zusammenfassung (engste wechselseitige Abhängigkeit) zwischen dem, was die Rolle des Grundes und dem, was die Rolle der Figur übernimmt." [Id.: 283]

¹⁷³"Daraus ergibt sich, daß alle Figur-Grund-Verhältnisse nach dem Grade der Umschlagbereitschaft (Reversibilität) geordnet werden können in einer Reihe, an deren einem Ende die willkürlich und beliebig reversiblen Muster stehen, während sich am anderen Ende diejenigen Muster befinden, deren Umschlag unmöglich oder so gut wie unmöglich ist." [id.: 289]

¹⁷⁴Cf. [id.].

‘pressure’ to be regarded than the whole. In some giant cathedrals, the overwhelming presence of the whole often even ‘pushes’ the visitor to its parts (e.g. a side-chapel, the choir-stalls, the monstrance, the catacombs) through which the all-powerful whole becomes accessible and bearable in the first place. As with figure-ground structures, however, there are no absolute thresholds in terms of reversibility.¹⁷⁵ In principle, it is never impossible to – literally as well as figuratively – see the forest for the trees and vice versa, although the ‘pressure of reversing’ might not always be equally directed to all perceptible sides.¹⁷⁶

Thirdly, there are not only degrees of a multistable object’s potential of reversibility, but also degrees in the experience of the actual movement in which such an object reverses. This movement manifests itself as a kind of ‘gradient’ (*Gefälle*), which can either be unique and complete, like in the faces-goblet illusion of Figure 7-4, or gradual and smooth, for example when adjacent surfaces with homogeneous colors alternate their figure-ground constellation. It is also possible that the experience of the gradient entails several discrete layers, each of which can serve as a ground for a figure but functions at the same time as a figure on a ground.¹⁷⁷ The latter is the case, to give an example of my own, when we are sitting as a student in the back of a classroom. Then the other students in front of us can be a figure of the first order for which the professor serves as ground, while the latter, in turn, can be a figure of the second order, standing in front of the blackboard, which is itself a figure of the third order, standing out from the wall behind it as ground, etc. Since figure-ground layers should be distinguished from measurable levels of ‘closer’ and ‘farther’, i.e. of foreground and background,¹⁷⁸ however, we can alternate this constellation and order of layers, for example when we concentrate on the professor (first order figure), who might either talk directly to the students (second order figure) *or* write something on the blackboard (second order figure).

Now it should not be surprising that we can find the same three types of alternating gradients in part-whole alternations as well. Firstly, to pursue the above example further, there is a unique and complete shift when we turn from the situation of the class as a whole, for instance from our impression of its social and educational function¹⁷⁹ that is not inherent in any of the parts in isolation, to one or more single parts, for instance to an annoying student who *happens* to disturb the functioning of the whole. Suddenly and without transition, this part stands out from the whole, which is then backgrounded for the moment. A comparably smoother transition between

¹⁷⁵“Im strengsten Sinne gibt es keine Muster, die vollkommen willkürlich, d. h. in 100% aller Beobachtungen, zum Umschlag gebracht werden können, andererseits aber auch keine Muster, deren Umschlag ganz unmöglich wäre.” [id.]

¹⁷⁶This finding corresponds with the experimental research of Hochstein et al. [2002], according to which every act of perception is a combination of an implicit, i.e. unconscious bottom-up ‘vision at a glance’ of basic-level categories and an explicit, i.e. conscious top-down ‘vision with scrutiny’ of more detailed aspects in the perceptual field. Both types of vision reflect cortical mechanisms on different levels. Whereas the former type implies the classical hierarchy in which wholes are perceived immediately and are therefore prior and higher, the second type of vision implies what the authors develop as ‘Reverse Hierarchy Theory’, in which the process of vision is directed to the detailed parts rather than to the whole of the visual field: “Detailed scrutiny, focusing attention to particular locations or objects, unbinds illusory conjunctions of features and rebinds the features veridically to identify items actually within the scene. Thus, vision with scrutiny is required to unbind initial incorrect conjunctions and revise vision at a glance when unexpected conjunctions are present in the scene.” [Hochstein et al. 2002: 796]

¹⁷⁷Cf. [id.: 300 f.].

¹⁷⁸Cf. subsection 7.4.1 above.

¹⁷⁹This is an example of what Gestalt theorists often call a *Bezugssystem*, a system of reference. Cf. Rausch [1966: 898], Ash [1995: 375] and Metzger [2001: 131].

parts and whole would take place when the professor writes the homework for the next meeting on the blackboard. Then the class as a whole in its characteristic of a recurring event alternates almost impalpably with the particular moment of homework-assignment. Furthermore, if we only consider the persons present in the classroom and their distinctive spatial position, then several part-whole layers can be distinguished: all persons (whole of first order), the students (whole of second order), the students sitting in the back row (whole of third order), etc. Thus Ehrenstein's different types of experientiable gradients in ambiguous figure-ground phenomena also applies to ambiguous part-whole phenomena, perhaps also because, as Attneave observes, the stability of a multistable phenomenon is often generated via constant switches from the part level to the whole level and back again.¹⁸⁰ There are examples from everyday life and perception in abundance,¹⁸¹ and the only difference between figure-ground and part-whole in this regard is that while a ground is experienced as lying outside of and not necessarily geometrically 'behind' the figure,¹⁸² a part is experienced as being 'inside' the whole, yet not necessarily according to the model of a physical container.¹⁸³

To conclude, the rethinking of multistable phenomena, including but also transcending phenomena displaying ambiguous figure-ground relations, has led to a positive and a negative insight. Both insights are based on the opening question of this section: whether it is possible to discover in the field of perceptual multistability an appropriate, i.e. dynamic and flexible hierarchy for interdependent part-whole structures with emerging and demerging perceptual meanings. The positive insight might respond to this question that there is indeed empirical and argumentative evidence for the subsumption of such part-whole structures into the more

¹⁸⁰“In certain ambiguous figures we can clearly see the nature of the positive feedback loop that accounts for the ‘locking in,’ or stabilization, of one or another aspect of the figure at any given time. For example, if in the young girl - old woman figure [Figure 7-6, M.S.] a certain line is tentatively identified as a nose, then a line below it must be the mouth and the shapes above must be the eyes. The partial identifications mutually support one another to form a stable perception of an old woman. If, however, the line we started with is seen as a chin instead of as a nose, then the perception formed is that of a young woman. The identification of wholes and parts will likewise be reciprocally supportive, contributing further to the locking-in process.” [Attneave 1971: 66]

¹⁸¹There is a famous example from the Gestaltist literature (cf. Rausch [1966: 898] and Metzger [2001: 141 f.]) that shows how cognate figure-ground and part-whole perception often are. Although this example concerns only a particular *non-ambiguous* figure-ground and part-whole perception, it is still revealing because it demonstrates how in ordinary language, both structures can be blurred without inconsistencies for referring to the object in question. A button, the example goes, can be said (and perceived) to be either *on* a skirt, or *belonging to* a skirt. While the first possibility refers to a figure-ground relation, the second refers to a part-whole relation. Formally, as Rausch points out, the first possibility presupposes that the skirt is already complete without the button (complete skirt = textile) while the second possibility presupposes that the skirt would be incomplete without the button (complete skirt = textile + button). To avoid this confusion, we could distinguish ‘complete skirt’ (button + textile) and ‘incomplete skirt’ (textile without button). But then it would be both wrong to say that ‘the button is on the incomplete skirt’ (because then the skirt would not be incomplete), and it would be wrong to say that ‘the button is on the complete skirt’ (because if the skirt is already complete, there would be no use for another button). By just using the word ‘skirt’ in our ordinary language, Rausch concludes, we avoid this antinomy and use ‘skirt’ as an equivocation the meaning of which is indeterminate. If we accept the cognitive linguist paradigm that language relies on (embodied) perception, then this example implies that in cases like these, a clear demarcation between figure-ground and part-whole would lead to certain predicaments, or, positively formulated, that both phenomena show some overlaps, which allows for – as I am doing in this section – the transposition of characteristics from one to the other.

¹⁸²Cf. Rubin [1921: 50].

¹⁸³Cf. the argumentation in subsection 4.2.4.

general category of multistable phenomena. The hierarchy inherent to such phenomena cannot, as we have seen, be unchanging, because with every alternation what has been ‘higher’ (e.g. a figure, an abstract or figurative pattern, a whole) changes into what is supposed to be ‘lower’ (e.g. a ground, another abstract or figurative pattern, one or more parts). Then, perhaps by what Metzger describes as a ‘change of conception’ (*Auffassungswechsel*¹⁸⁴), the existence of a new interim yet stable hierarchy with unforeseen perceptual meanings can be said to appear in the sense of ‘snapping into place’. As a multistable phenomenon, PWO is thus neither ontologically ‘flat’, because there is always some kind of verticality involved, nor is there any default vertical chain of being that is in any sense unalterable. Furthermore, the rethinking of multistability has also shown how PWO’s parameter *reality*, i.e. its reality-directedness that already surfaced in the distinction between conceptual metonymy and synecdoche,¹⁸⁵ can be satisfied. This happens through the – albeit speculative – localization of more than one perceptual meaning already in the stimulus level and also through the expansion or universalization of multistability beyond rarely occurring visual illusions. For these reasons, we can identify the appropriate hierarchization of parts and whole in PWO with the alternating hierarchies that form the basis of multistable phenomena in general.

The negative insight, however, consists in the fact that I have not arrived at one or more *concrete* alternative hierarchical models into which the just delineated positive insight could be implemented. Although it would be consequential and worthwhile, I have to concede that the development of such a model, but also only the introduction and critical discussion of already existing models, would go beyond the limited scope of and capacities for the present project. For this reason, the elaboration of this subject matter has to remain a mere suggestion for further empirically inspired ontological or even metaphysical research in this regard. As alternatives to the classical notions of triangle-shaped or pyramid-shaped hierarchies,¹⁸⁶ one could, for example, take into consideration the philosophically still little regarded ideas of what W. McCulloch introduced as ‘heterarchy’,¹⁸⁷ A. Koestler as ‘holarchy’ or ‘Self-regulating Open

¹⁸⁴“Das Bemühen um eine andere Auffassung kann aber auch ganz anders beschaffen sein, bescheidener, weniger ‘frei’ und selbstherrlich, nicht selbst formend, sondern nur suchend: ohne ein von dem Betrachter selbst vorher fest bestimmtes Ordnungsprinzip; nur darauf bedacht, tiefer in das Gegebene einzudringen, einen günstigeren Standpunkt oder ein günstigeres Licht zu gewinnen, (etwa durch Zurücktreten) eine bessere Übersicht oder (z. B. durch Augenreiben, Brillenaufsetzen u. dgl.) eine festere Reizbindung zu erzielen; alles, um neue Merkmale daran zu entdecken, durch deren Hinzukommen das anschaulich Vorliegende vielleicht plötzlich aus sich heraus, ohne Zwang des Betrachters, sich ganz neu gestalten, neu ordnen, neu gliedern, neu zentrieren, einen neuen Maßstab gewinnen könnte [...]” [Metzger 2001: 234]

¹⁸⁵Cf. subsection 5.2.4 and the corresponding determination PWO_{ind_lang_3}.

¹⁸⁶Cf. Leisegang [1951] on the philosophical history and implications of this type of hierarchy.

¹⁸⁷Cf. McCulloch [1945] and for a definition and sociological examples Crumley [1995: 2]: “Heterarchy may be defined as the relation of elements to one another when they are unranked or when they possess the potential for being ranked in a number of different ways. [...] While hierarchy undoubtedly characterizes power relations in some societies, it is equally true that coalitions, federations, and other examples of shared or counterpoised power abound. The addition of the term heterarchy to the vocabulary of power relations reminds us that forms of order exist that are not exclusively hierarchical and that interactive elements in complex systems need not be permanently ranked relative to one another. In fact, it may be in attempts to maintain a permanent ranking that flexibility and adaptive fitness is lost.”

Hierarchical Order (SOHO)',¹⁸⁸ or H. Rombach as 'niveau'¹⁸⁹ within the context of his detailed *Strukturontologie*.¹⁹⁰ Suffice it to say that there is much potential in these and other alternative hierarchical models for an adequate elucidation of interdependent part-whole structures. In any case, with the positive research findings of this section, it is time to formulate the fourth and, for the present project, final determination of the ontological nature of PWO within the domain of empirical perception:

PWO_{ind_emp_4}: A part-whole oscillation (PWO) is a perceptible process of two-sided part-whole dependency in which both parts and whole can alternately stand out as being foregrounded and/or backgrounded, which makes the part-whole entity in question ambiguous and multistable. This precludes the assumptions both of an unchanging ontological hierarchy of parts on a lower and the whole on a higher level and of a flat ontology in which there are no vertical levels at all. Like the process of PWO itself, the hierarchy in which its different aspects are ordered is fundamentally reversible and perceptible in its reversions.

After having arrived at this fourth partial determination of PWO for the realm of empirical perception, we have gained a sufficient amount of combinable data to formulate a complete ontological determination of PWO that is experience-based in a bottom-up fashion, which is in accordance with the 'inductive' method of the present project. This determination, together with a summary of this project's line of argumentation and its potential for integration into a broader ontological framework, I will provide below in the 'General Conclusion'. Prior to this, however, let me just point out one terminological, or rather definitional, issue that has come to the fore during the previous reflections on the notion of 'Gestalt' and the part-whole structure it consists of. We can put the question as follows, thereby alluding to the very first lines of chapter 6: What is a 'Gestalt' in terms of parts and whole, i.e. how should 'Gestalt' be

¹⁸⁸The following longer quote from Koestler [1970: 135–6] serves to give a clearer picture of this interesting notion: "A part, as we generally use the word, means something fragmentary and incomplete, which by itself would have no legitimate existence. On the other hand, there is a tendency among holists to use the word 'whole' or 'Gestalt' as something complete in itself which needs no further explanation. But wholes and parts in this absolute sense do not exist anywhere, either in the domain of living organisms or of social organizations. What we find are intermediary structures on a series of levels in ascending order of complexity, each of which has two faces looking in opposite directions: the face turned towards the lower levels is that of an autonomous whole, the one turned upward that of a dependent part. I have elsewhere proposed the word 'holon' for these Janus-faced sub-assemblies – from the Greek *holos* – whole, with the suffix *on* (cf. *neutron*, *proton*) suggesting a particle or part. The concept of the holon is meant to supply the missing link between atomism and holism, and to supplant the dualistic way of thinking in terms of 'parts' and 'wholes,' which is so deeply engrained in our mental habits, by a multi-levelled, stratified approach. A hierarchically-organized whole cannot be 'reduced' to its elementary parts; but it can be 'dissected' into its constituent branches of holons, represented by the nodes of the tree-diagram, while the lines connecting the holons stand for channels of communication, control or transportation, as the case may be."

¹⁸⁹Rombach [1980: 232] describes this experienced-based concept here in a nutshell: "Es muß mit aller Deutlichkeit festgehalten werden, daß das, was hier mit 'Niveau' und 'Rang' bezeichnet wird, den nicht-hierarchischen Sinn von *Plateaus* hat, von *Dimensionen*, die sich übereinander aufbauen, und von denen die unteren als die fundamentalen die *Conditiones* – aber nicht die *Ursachen* – der höheren sind. Eine jede Dimension kann nur dadurch 'sprechend' werden, daß sie ihre Qualitäten als *herausgehobene* Bestimmungsweisen zu erfassen gibt. Qualitäten können sich jedoch nur dann herausheben, wenn sie vor einem Hintergrund oder Untergrund erscheinen. Hinter- und Untergrundgegebenheiten sind die Qualitäten fundamentalerer Dimensionen. [...] Was wir Dimensionen, Plateaus oder Niveaus nennen, sind *Reflexionsstufen* der Wahrnehmung."

¹⁹⁰Cf. Rombach [1988; 1994; 2003; 2010] and the reflections on it in Stadler [2014; 2015].

understood mereologically? For the purpose of introducing ‘Gestalt’ in an intuitively accessible manner, I wrote that a Gestalt ‘is a complex yet uniform entity which can be a content of perceptual experience, in other words, it is a perceptible *unity in diversity* and/or a perceptible *diversity in unity*.’ Now, in the light of the preceding discussion of one-sided and two-sided part-whole dependency, three answers to this question, i.e. three specifications of this preliminary characterization, offer themselves:

1. We can say with Ehrenfels that ‘Gestalt’ mainly relates to the ‘diversity’ side in being a perceptual part that is added to a sum of stimulus parts in order to create – but only in an ontologically secondary step – a (decomposable) perceptual whole, i.e. a unity. A ‘Gestalt’, as a part, is thus an additional ‘quality’ that is addable to the sum of previously existing and primary stimulus parts. In short and somewhat oversimplified: *Gestalt = Gestalt quality = part*.
2. This definition of a Gestalt can be contrasted with the view of the Berlin school, according to which a Gestalt denotes the perceptual whole rather than (one of) its parts.¹⁹¹ A ‘Gestalt’ in this sense is thus more on the unity side of the given characterization, and this unity side, as we have seen, both epistemologically and ontologically precedes the diversity of individual parts. In short and somewhat oversimplified: *Gestalt = (perceptual and natural¹⁹²) whole*.

What both conceptions have in common, however, is that they seem to understand ‘Gestalt’ as something both hierarchical (with either the part(s) or the whole as being the primary side) and as something static.

3. In developing the idea of PWO within the framework of traditional and contemporary Gestalt theory, I want to suggest a third way in which we can understand the term ‘Gestalt’, namely as a back and forth movement that reverses the hierarchy between parts and whole continuously. In short and somewhat oversimplified: *Gestalt = (parts \rightleftharpoons whole)*. This conception would embrace both the unity and the diversity side of the given characterization, but without combining them both into a ‘higher’ unity of unity and diversity, which would only be to the detriment of the diversity.

Although my own position in this matter seems to be obvious by now, this is not the place to argue in favor of any of these three mereological conceptions of ‘Gestalt’ or to discuss further

¹⁹¹Cf. Mulligan et al. [1988: 130 f.]: “Ehrenfels acknowledges that the notes constitute in and of themselves a certain complex whole, and that the Gestalt quality is founded upon (is, precisely, a ‘quality of’) this complex whole. But the quality itself is not a whole embracing the individual sensational elements of parts: a view of this sort was developed only with the work of Wertheimer and the other members of the Berlin school.”

¹⁹²‘Natural’ here relates to the fact that Wertheimer and in particular Köhler held the view that Gestalts also occur in the physical sphere (both in our nervous central system and in physical phenomena such as electrical fields), and that there is an isomorphism, i.e. a structural similarity between perceptual and physical Gestalts such that the former are actually derivable from the latter. Since I have concentrated on perceptual phenomena, it was not necessary to delve into this important and still discussed topic of Gestalt theory’s inherent naturalism. Cf. on Gestalt Theory’s psychophysical isomorphism for example Köhler [1920; 1929], Henle [1984], Epstein et al. [1994], Ley [1996], Luccio [2010], Luchins et al. [2015], and Lobb [2016]. Cf. for phenomenology’s critique of this naturalistic stance Husserl [1976] and Merleau-Ponty [1967; 2012].

possible ones. The only consequence I want to draw from this terminological or definitional issue is to suggest a clear demarcation to avoid the term ‘Gestalt’ becoming a homonym for too many significations. Let us therefore use ‘Gestalt quality’ for a part (as property, quality, mode of appearance) of a whole that makes it in one way or another ‘different from the sum of its parts’, and let us use ‘Gestalt’, according to the Berlin view, as this whole itself. For PWO in the realm of perceptible part-whole structures, I suggest the nominalization ‘Gestaltung’, which is close enough to ‘Gestalt’ to be identified with this particular discourse, but which both accentuates with the suffix ‘-ung’ the dynamic character of a movement and with the general German meaning of ‘Gestaltung’ also the creative potential for meaning-generation such an interplay between parts and whole involves.¹⁹³ The three terms ‘Gestalt quality’, ‘Gestalt’ and ‘Gestaltung’ thus do not exclude each other, but could be regarded as a historically grown progression of what is identifiable as and within the empirical perception of part-whole structures.

¹⁹³“Taken as a verb, *gestalten* describes precisely the activity of the potter, sculptor or Demiurge in forming, shaping, moulding [...]” [Simons 1988: 160]