Part-Whole relationships in Gestalt psychology

The work of Edwin Rausch

Master Thesis by Neal Hermse

Promotor: Johan Wagemans

Katholieke Universiteit Leuven
Faculteit Psychologie en Pedagogische Wetenschappen
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Summary

Out of the theoretical foundations laid out by the predecessors (e.g., von Ehrenfels, Husserl, Stumpf) two gestalt theoretical traditions emerged. The Berlin tradition (e.g., Wertheimer, Koffka, Köhler) was the most influential tradition of Gestalt psychology. Its main idea, which distinguished it from the Graz tradition (e.g., Brentano, von Ehrenfels, Benussi) was that the whole was different (not only greater) than the sum of the parts and that the whole could influence the parts. These ideas appear to be in conflict with the currently popular notion of a hierarchical processing stream from elements (features, parts) to objects (configurations, wholes). A second generation of Gestalt researchers followed the traditions after which in the second half of the 20th century the concepts of Gestalt psychology moved to the background. Only in small groups research on Gestalt psychology continued, most notably in the Italian Gestalt Tradition. Since the 1970s and 1980s there has been a renewal and revival of Gestalt psychology.

In the light of this revival this thesis takes a closer look at the work of Edwin Rausch. Edwin Rausch was one of the most important representatives of the Gestalt theory of the second generation in Germany. Rausch has written a number of important Gestaltist contributions that are (psycho) logically very refined. His work is largely forgotten because it is difficult and it has never been translated. To study this work and frame it within the debate between the Graz and Berlin traditions, a number of his publications on this topic were selected to be restructured, summarised and translated. Additionally, this effort will make Rausch's work more accessible to the scientific community and the modern reader. The thesis includes English summaries of the publications: "Variabilität und Konstanz als phänomenologische Kategorien" (1949), "Zur Phänomenologie Figural-optischer Dynamik" (1950), "Zum Problem der Ähnlichkeit" (1951), "Einzelgegenständlichkeit als phänomenale Eigensehaft" (1964) and "Das Eigenschaftsproblem in der Gestalttheorie der Wahrnemung" (1964).

After synthesizing the Gestalt theoretical concepts offered by Rausch, the thesis aims to answer the questions: Where does Rausch fit in the outlined Gestalt theoretical history, what is his position in the debates between Gestalt traditions, and does his work provide answers to unresolved questions on Part-Whole relationships? To do so, the Gestalt theoretical concepts offered by Rausch are framed in a mereological**,** Gestalt psychological, and modern theoretical basis.

Foreword

I would like to thank professor Wagemans for advising me in the process of writing this thesis. I would like to thank him for patiently answering all my Gestalt theoretical questions, no matter how off topic they where. Through the process of writing this thesis I was introduced to a whole new way of analyzing problems. So, last but certainly not least, I would like to thank professor Wagemans for giving me the opportunity to discover the world of Gestalt psychology.

Neal Hermse, 16 Mei 2013

Approach

In order to understand the work left by Rausch I started by studying a number of texts and books, suggested to me by professor Wagemans, on Gestalt psychology and its history. I used these to write a summary outlining the history and principles of Gestalt psychology.

After this I collected information on Rausch and his work. After reading through his work I made an overview of his publications and a brief discription of their content. As suggested to me by professor Wagemans, the work of Rausch was divided in three periods. One of his publications was already selected for translation by Professor Wagemans, and four additional works where selected in consensus. After studying the selected works I started on translating and summarizing them. The content of his work is very difficult and written very formally. Because of this the studying, understanding, summarizing, translating, restructuring, rewriting and explaining the content in a summary took a great efford on my part. An effort which unfortunately can only be fully understood by readers familiar with the work of Rausch. During this process, which took the better part of year, a number of versions of the summaries where thoroughly checked by Professor Wagemans.

After translating the works I read more on the debate between the Gestalt traditions, their theoretical underpinnings and their respective positions in the debate. The book I used for this was given to me by professor Wagemans. I made a summary which I used to systematically search the now translated works for information directly or indirectly related to the debate. I summarized the selected information and described in detail how they are related to eachother and the debate. Using this information I defined and substantiated the position Rausch takes in the debate with information taken only from the translated works available to the reader. I wrote a conclusion summarizing my findings.

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1 **The history of Gestalt Theory**

The history of Gestalt theory will briefly be outlined to function as an introduction. This is not a detailed account of all the contributors to Gestalt theory throughout its history. Only the the main developmental stages of Gestalt theory and the some of most influential and representative contributors of each stage and their significant contribution to Gestalt theory are discussed. The information for the outlined history was found in the book *Foundations of Gestalt Theory* by B.Smith (1988).

Predecessors

The predecessors were scholars from different scientific fields whose ideas paved the way for the foundation of the Gestalt movement. The predecessors and their theoretical contributions are discussed more elaborately to function as an introduction to the main ideas underlying Gestalt psychology to those unfamiliar with it.

As can be said of psychology in general, Gestalt Theory has known a long history and a short past. Even though the roots of of the ideas found in Gestalt Theory can be traced back much further in history, Ernst Mach (1838-1916) marked the beginning of Gestalt theory as it is defined today. Mach was an Austrian mathematician, physician and philosopher. Characteristic of his approach was that he was very rigorous in applying scientific methodology in his research. To him no statement in science is acceptable unless it is empirically verifiable and repeatable. Due to his rigorous criteria he rejected empirically unvalidated concepts as absolute time and space. Mach discovered that the human eye has the tendency of to see bright or dark bands near the boundaries between areas of strongly contrasting brightness (later called “Mach bands”).

Mach viewed knowledge as a collective organization of sensory experiences. Most notably he described how every part of an experienced structure corresponds to one or more sensory elements that can also be experienced in isolation.

In 1886 Mach published his most significant work in de context of Getalt Theory: “Beiträge zur Analyse der Empfindungen”. This work was important as it inspired two of the most influential predecessors of gestalt Theory to develop simultaneously very similar concepts. Both Christian von Ehrenfels and Edmund Husserl are thought to be inspired by Mach's work.

In 1890 the Austrian philosopher Christian von Ehrenfels (1859-1932) published a paper entitled “Über Gestaltqualitäten” (On Gestalt-qualities) in the Journal of Scientific Philosophy. Through this work he first introduced the concept of a “Gestalt” in contemporary philosophy and psychology. His paper “On Gestalt Qualities” functions as a terminological foundation for the Gestalt movement. In this paper he approached the question what complex formations such as melodies might be. As many of the leading figures in the Gestalt theory he was a passionate musician and often used musical analogies and examples. A melody is a structured whole composed of a series of notes arranged in a specific sequence. We are able to recognize a melody if it is played in another pitch, speed or if parts are missing. This suggests that the structured whole of the melody is a distinct and separate entity from the elements it is composed of and that this entity is more than the individual sensory elements it is composed of.

According to von Ehrenfels we grasp a Gestalt and its qualities in one glance and are unable to detect the discontinuities or boundary lines between the sensory elements it is composed of. Hence structured wholes or “Gestalten” rather than sensations are the primary units of our mental life. This concept also applies to inner perceptions such as memories, mental states and the representations of our own feelings. According to von Ehrenfels a Gestalt is constructed from sensory elements combined from different senses from inner and outer perceptions. A Gestalt combines with another Gestalt to form a higher (second) order Gestalt, which in turn can combine with others to form a higher third order Gestalt, and so on. One can think of complex structures such as language, art and civilisations as higher order Gestalten.

In 1891 Edmund Husserl (1859-1938) published his paper entitled “Philosophy of Arithmetic”. Husserl was a German mathematician and philosopher who developed ideas very similar to those of von Ehrenfels.

In his paper he discusses characteristic figural movements in groups of objects and uses the example of a group of birds. If there is more than one bird it would be sufficient to describe this by saying there are multiple birds, or a group of birds. However, more often than not, people will describe this as a swarm or flock of birds which implies it possesses a certain characteristic quality. Other examples in this line of thinking are an “Avenue of streets”, a “Line of soldiers” or a “Heap of apples”. Just as von Ehrenfels, Husserl believes we capture the characteristic qualities of a whole in one glance and no boundaries can be detected between the elements it is composed of. He describes this as “Fusion”.

In his paper Husserl describes the abstract concept of a Gestalt is best understood as a cognitive category. These cognitive categories can be described as cognitive species organized in a evolutionary tree. At the bottom of the tree there are the simplest cognitive species which en-capture all the gradually more specific (higher order) cognitive species one finds as one goes up the tree. Husserl additionally contributed to the Gestalt theory by describing the concept of unity of the elements. In doing so Husserl makes a distinction between phenomenological and objective moments of unity. As oposed to objective moments of unity phenomenological moments of unity exists continuously over time and depend on the existence of certain acts and mental states. An example of a phenomenological moment of unity is the human ego.

A third influential predecessor who contributed to the foundation of Gestalt theory was Carl Stumpf (1838-1916). Stumpf was a German philosopher, psychologist and musician. In his works Stumpf makes a refines the distinction between a complex and a Gestalt.

He describes a complex as a whole of sense contents. A Gestalt on the other hand is a whole of sense contents which additionally has a relational attribute connecting the sense contents, which is its essence. In other words: every Gestalt is a complex, but not every complex is a Gestalt. This relational attribute is transposable, meaning that it is transferable to another complex. For example: we can recognize a melody even if it is played in a different pitch or at a different speed. This is because the relational attribute (the melody) is transposable. In his view a Gestalt and the elements it is founded in are categorically different. Notably Stumpf thought a number of students who went on to become representatives of the Gestalt movement such as Max Wertheimer, Kurt Koffka and Wolfgang Köhler. He is considered the mentor who taught the Gestalt theorists to become experimenters.

Berlin and Graz Tradition

Out of the Gestalt theoretical foundations laid out by the predecessor's two Gestalt theoretical traditions emerged. The Graz tradition and the Berlin tradition have a different approach to a number of central topics within Gestalt psychology. The Gestalt theoretical differences between the two traditions are elaborately discussed in chapter 4. The founders and some of the most influential representatives and their contribution to their respective traditions are briefly discussed.

Representatives of the Graz tradition

The founder of the Graz tradition at Graz University was the Austrian psychologist and philosopher Alexius Meinong. Meinong was a friend and supervisor of von Ehrenfels, who is one of the most notable representatives of the Graz tradition. Just as von von Ehrenfels and Husserl before him Meinong regards the Gestalt and the elements it is founded in as two separate entities comparable to matter and form. In his work he further emphasizes the importance of the relationships between the elements such as similarities and differences.

He provides the intriguing example of how we can determine that two given colours are different, but we cannot physically see this difference. In much the same way we can physically see the elements a Gestalt is composed of, we cannot physically see the Gestalt. This is because they are ideal concepts existing above the elements. So in contrast to von Ehrenfels who defines a Gestalt as existing parallel to the elements it is founded in, Meinong defines a hierarchy in which a Gestalt functions above the elements it is founded in. As such Meinong defines a Gestalt as an object of higher order.

Since the early beginnings optical illusions are associated to Gestalt theory as they are the result of the continuous categorizing of sensory elements in an attempt to make sense of our environment. The Italian philosopher and psychologist Vittorio Benussi (1878-1927) contributed to Gestalt theory with his extensive work on Gestalt changes in optical illusions. Benussi was also one of the most noted researchers of the Graz tradition He attained his PhD in 1901 on the topic of optical illusions.

Representatives of the Berlin tradition

Max Wertheimer (1880-1943) is seen as the founder of the Berlin tradition of Gestalt Theory. Wertheimer was a Czech philosopher and psychologist. Wertheimer was particularly interested in motion perception and studied this with a tachistoscope. A tachistoscope displays an image for a short amount of time. During these studies Wertheimer discovered an optical illusion of motion, which he called “Phi motion”. In this illusion of motion the perception of motion exists only phenomenologically as no movement between perceived elementary objects exists. Hence it is also sometimes called pure - phenomenal motion. His younger assistants Köhler and Koffka where his test subjects in this discovery. These two young assistants would continue to shape the Berlin tradition.

Kurt Koffka (1886-1941) was a German philosopher and psychologist. Koffka was known for his interest in developmental psychology, which he approaches from a Gestalt theoretical perspective. Central themes in Koffkas studies are learning by imitation, a key system to learning he called "Sensorimotor learning", classical conditioning, and what he considers the highest form of learning: “Ideational learning”, which is learning through spoken or written language. As he regarded Ideational learning as the highest form of learning, he emphasized that an important time in children's development is when they understand that objects have names. In 1935 he published his last and most influenctial work “Principles of Gestalt Psychology”. In this work he addresses all basic themes within Gestalt psychology.

Wolfgang Köhler (1887-1967) was an Estonian scientist with a background in natural sciences. He studied philosophy, history, physics and experimental psychology. He obtained his PhD on acoustics in 1908. He worked with chimpanzees for 6 years, studying the nature of intelligent acts. From this he developed theories of learning through problem solving. Learning through problem solving states that one learns by remembering the solutions one finds for problems. This way apparently unrelated elements occuring in a situation can make sense when placed in a meaningful relation to each other. From 1956 until 1959 Köhler was the president of the American Psychological Association (APA). In 1962 he was offered the honorary citizenship by the University of Berlin.

Summarizing the progress of the Graz and Berlin tradition within Gestalt theory one could say that organizing principles that regulated the formation of Gestalts from interactions between sensations were discovered. The Gestalt principles were first introduced by Wertheimer and further developed by other researchers such as Köhler and Koffka. At first there were significant limitations to the Gestalt principles. The laws themselves were mere observations, and as there were no models or neurological underpinnings they could offer little explanation as to why these observations took place.

A second limitation was that the described laws often applied to specific situations and circumstances, and even small deviances from these circumstances would fail to produce the Gestalt. This meant that every law had an abundance of exceptions. To solve the limitations and to avoid a proliferation of laws, the law of Prägnanz was introduced as a general governing rule. It describes how a perceived Gestalt will only be as good as the prevailing conditions allow.

The second generation

A second generation of Gestalt researchers followed the Graz and Berlin tradition. Generally it can be said that this second generation of Gestalt theorists incorporated elements from both the Graz and the Berlin tradition in their work. Even though this softened the debate between the two traditions debates continue. This is discussed in more detail further on. The most influential and representative contributors of the second generation and their theoretical contributions are briefly discussed.

Wolfgang Metzger (1899-1979) studied with Wertheimer, Koffka and Köhler in Berlin. First Metzger was the assistant, and later the successor of Wertheimer. He is most known for his work “Gesetze des Sehens” (1953). In this work he describes phenomena from everyday life and art from a Gestalt point of view. In contrast to many of the works written by his fellow Gestalt psychologists this work is written nontechnically, which makes it very accessible to readers who do not possess a background in Gestalt Theory. Metzger became an honorary member of the GTA (Society for Gestalt theory and its Applications) in 1978.

The Italian Gestalt Tradition

In the second half of the 20th century, after the second generation of Gestalt researchers, the rise of computer models and generally an atomistic approach in neuroscience implied that the concepts of Gestalt psychology moved to the background.

Only in small groups research on Gestalt psychology continued, most notably in the Italian Gestalt Tradition. The Gestalt tradition was brought to Italy by Benussi. Benussi immigrated to Italy after the First World War and through him Graz Gestalt psychology entered Italy more or less by accident.

While back in Italy Benussi directly and indirectly influenced a number of Italian scientists who were to shape the Italian Gestalt Tradition, one of them was Cesare Musatti (1897-1989). Musatti was born in Italy and student of mathematics and philosophy at the University of Padua but eventually studied psychology under the influence of Benussi. He became Benussi's assistant and eventually replaced him in the chair of psychology. Being an ethnic Jew he was forced to leave his position during the Second World War, but after the war he became director of the Psychological Institute at the University of Milan. He is known for his psychoanalytic writings among which the editing of the Italian edition of the works of Sigmund Freud. He was responsible for introducing the Berlin Gestalt theory to Italy.

Mussatie in turn influenced Fabio Metelli (1908–1987). Metelli was born in Italy and graduated from the University of Padua in 1929 with a thesis on the aesthetics of Plato. After his graduation he was voluntary assistant to Musatti until 1940. From 1940 to 1942 he worked for the National Council of Research and was granted the title of "Docent" in 1942. In 1943 he directed the Psychological Institute in Padua. After spending some time in Catania and Trieste, he was named professor in 1951.

Gaetano Kanizsa (1913–1993) was born in Trieste as a son of a Hungarian father and a Slovenian mother. He graduated at the University of Padua in 1938 under Musatti's supervision with a thesis on eidetic imagery. During this time he met Metelli who worked as Musatti's assistant. Kanizsa followed Musatti to Milan and became his assistant in 1954. He was given the title of professor of psychology at Trieste. He is most known for his work on modes of color appearance, subjective contours and phenomenal transparency.

The revival

In the 1970s and 1980s, encouraged by new findings of Gestalt phenomena, researchers found that the fundamental ideas of Gestalt psychology could still be relevant. This led to a renewal and revival of Gestalt psychology. In past years a renewal and re-examination of Gestalt psychology is on the rise. Fuelled by modern techniques in stimulus displays, computer models and indirect behavioural measures, new empirical research has sprung. For the first time, steps are taken to truly integrate Gestalt psychology into mainstream cognitive science and to combine modern knowledge of the visual system with Gestalt theory.

2 **Edwin Rausch**

In the light of this revival this thesis takes a close look at the works of Edwin Rausch (1906-1994). Rausch was one of the most important representatives of the Gestalt theory of the second generation in Germany. After studying mathematics at the University in Bonn he went to Frankfurt to study psychology under Wertheimer. In 1933 Wertheimer left Germany before the National socialists took over power and could not help Rausch finish his Phd work "Über Summativität und Nicht-Summativität". Metzger did so in his place.

During his life Rausch made several important contributions to Gestalt psychology. Reading original work from Rausch is an acquired taste; it takes an effort to understand and appreciate the substantially difficult and often abstract texts that are very (psycho) logically refined. Additionally some of his work is too abstract-formalistic to be considered phenomenological. Unfortunately, for these and other reasons, the original German versions have never been translated to English and his work is largely forgotten. This makes it inaccessible to a substantial part of the English speaking scientific community. Additionally his work might contain forgotten answers to Gestalt questions that have remained unanswered up to now. This leaves two tasks: first to make his work more accessible to the modern reader and English speaking scientific community and secondly to frame his work in the Gestalt psychology tradition. Based on subjects and writing style his work can be divided in three main periods.

The First Period

The first period is his doctorate entitled “Über Summativität und Nicht-Summativität” (1937). This fundamental work involves a systematic mathematical analysis of the concepts of Parts and Wholes. He explores and expands on the excising definitions of Summativität and nicht-Summativität in literature.

For the definitions used he strongly orients himself to the works of Köhler: It is considered a sum of parts if one can add parts one by one without changing the composition of the parts and if one can remove parts one by one without changing the composition of the removed parts changing. Rausch does not unconditionally accept these premises offered by Köhler but applies them as a starting point to test and explore this topic through mathematics and thought experiments. His writing style is very hermetical and is considered mainly inaccessible for a modern reader.

The Second Period

His later works written in the second period from 1949 to 1952 are substantially difficult and abstract but more accessible to the modern reader than his doctorate. The theoretical basis of the concepts of variance and constancy is central in this period. His first and most elaborate work from this period is "Variabilität und Konstanz als phänomenologische Kategorien" (1949). In this work Rausch analyses the phenomena of variability and constancy through debating the variability and constancy of certain phenomena and applies these concepts in describing the outcome of empirical study's. Other issues that are related to, and are sometimes needed to grasp the concepts of variability and constancy are described. This is one of his most important works and served as the foundation for two later additions.

The first published addition was "Zur Phänomenologie Figural-optischer Dynamik" (1950). This addition aims to introduce a new experimental method designed too for analyzing variability and constancy: The experimental method is based on the concepts described and illustrated in *Variabilität und Konstanz als phänomenologische Kategorien*. As a second addition he published "Zum Problem der Ähnlichkeit" (1951). In this addition he explores how concepts of variability and constants influence our judgement of similarity. Based on the concepts laid out in his work *Variabilität und Konstanz als phänomenologische Kategorien* he analyses the outcome of a series of experiments.

The Third Period

The third and last period of his work, from 1953 on, is generally more accessible compared to his preceding works and written in a broader perspective. His work “Einzelgegenständlichkeit als phänomenale Eigenschaft” (1964) was pubished in this period. He dedicated this work to the 65 birthday of Wolfgang Metzger. This work aims to answer three questions. What effects can the isolation of parts, or isolation of the parts, of a complex give? What can be meant with isolation in this context, and which (theoretical) conclusions can be drawn from the possible effects? These questions are framed in the Thesis by von Ehrenfels “On Gestalt qualities” (1890), deducing the position taken by von Ehrenfels and assessing its accuracy. Two years later Rausch published one of his largest works enclosing much of the information gained in his preceding works: “Das Eigenschaftsproblem in der Gestalttheorie der Wahrnemung*”* (1964). In this work he addresses fundamental concerns in Gestalt psychology and discusses the fundamental basics of Gestalt psychology topics such as properties and carriers, the observer and the environment, whole and part properties, Gestalt criteria, isolation and Prägnanz.

3. **Translations**

For the first task of making his work more accessible to the modern reader and English speaking scientific community publications from his work were selected, restructured into short coherent summaries and for the first time since the original publishing translated into English. It is important to emphasize that due to time and size restrictions placed on the thesis not all of his works where translated in the context of this thesis. After systematically exploring his work five publications were selected based on their Gestalt theoretical content. The works selected for translation are shown in Table 1.

Table 1

Works selected for translation

Title	**Year**
Variabilität und Konstanz als phänomenologische Kategorien (Variability and constancy as phenomenological categories)	1949
Zur Phänomenologie Figural-optischer Dynamik (Regarding Phenomenological Figure-Optical Dynamics)	1950
Zum Problem der Ähnlichkeit (Regarding the problem of Similarity)	1951
Einzelgegenständlichkeit als phänomenale Eigensehaft (Single-Objectivity as a Phenomenological Property)	1964
Das Eigenschaftsproblem in der Gestalttheorie der Wahrnemung (The Property Problem in the Gestalt Theory of Perception)	1964

The theoretical "density" of the selected works varies. Some are written very brief, whereas others are elaborate and include such things as tracing the origin of the used terminology in German linguistics, elaborate analogies and theoretical sidelines. Even though every summary is proportionally different to its original text the summaries contain all the essential Gestalt theoretical ideas and concepts offered by Rausch. Due to the nature of his work even the summaries are abstract and difficult at times. The images, tables and figures used in the thesis are enhanced originals found in his work.

Variabilität und Konstanz als phänomenologische Kategorien

Variability and constancy as phenomenological categories

1 **Introduction**

The concepts variability and constancy can be found in studies such as mathematics and experimental psychology, in which they are used as special phenomenological measures. Examples of such measures can be any measurement used to indicate phenomenological changes of the absence of such. Note that this is not how they are used in this work. Instead it is about the phenomena variability and constancy itself. In other words, this text does not debate the variability and constancy of certain phenomena, but the phenomena of variability and constancy.

If one were to go to a shop to purchase a piece of furniture, for example a closet, depending on the measurements of the room, one will look at the closets from a certain perspective to ensure it is the right size. The dimensions of the closet can be described in objective-geometrical or phenomenological terms. Describing the dimension of a closet objective-geometrically would mean describing the length of a dimension in for example inches or cm. Examples of phenomenological descriptions of the dimensions of a closet are high or small, broad or slender. These are general aesthetic properties. This example of purchasing a closet will be continued throughout the text to illustrate the discussed concepts.

2 **Variability and Constancy, Variables and Constants**

In general a first important distinction is made between dimensional properties and pure dimensions. The distinction is based on whether or not the aesthetic characteristics are linked to a specific dimension. In the example of the closet the aesthetic characteristics high and low are both linked to the dimension height. The characteristics high and low are therefore considered dimensional properties.

The aesthetic characteristic elegant versus plump on the other hand constitute pure dimensions, because a closet can be described as elegant with any given height and is therefore not tied to a certain dimension.

Additionally different subtypes of aesthetic properties can be distinguished based on their sensitivity to proportions and hierarchy. The first group are referred to as indifferent properties. Indifferent properties are not based on, and thus indifferent to, the proportions of the dimensions. An example of this is the property elegance. There are no proportional requirements for a closet to be experienced as elegant. In other words, a closet of any given dimensions can be considered elegant. The second group consists of hierarchy different properties. Hierarchy different properties depend on the assessment of one dimension. Two examples of hierarchy different property's are high and low. These properties are both based in the single dimension height and are not influenced by the width. A closet of any width can be considered high or low. This is important as depending on one dimension naturally creates a hierarchy among the properties, hence the name hierarchy different properties. In the example of the closets a hierarchy can be created ranging from the highest to the lowest closet. The third and last group are hierarchy indifferent properties. These properties are based on a set of proportions. In other words there are two requirements for these properties to exist. The first requirement is that there have to be at least two natural dimensions such as height and width. The second requirement is that one of these dimensions must be significantly more dominant than the other. For a closet in the example to be experienced as narrow there must be a height and a width present and the closet must be considerably higher than it is wide. Additionally, to be experienced as narrow, the Gestalt must also be centred along the dominant dimension. If the high closet from the example were to be laid on the floor on its side, it would not be considered high anymore. These properties are not hierarchical, meaning that naturally no hierarchical distinction is made between the hierarchy indifferent properties.

Distinguishing between these three types of properties raises a few important questions. When is which description used, and which description is used when different properties occur together? A possible approach to this question is that our judgement is based on previous experience(s). In an attempt to answer these questions additional concepts that help analyse this discussion need to be considered.

The first aspect is amount (M). In the furniture store in the previous example there would be a certain number (M) of closets to choose from. Being in the store you might be looking for a closet with particular aspects, selection criteria or requirements (J). All the elements from amount M that fit the requirements set in J are referred to as the found area (F). All the elements that can be described as “Too something”, or in other words, having too much of something (high, broad, narrow) are found by subtracting F from M.

The same analyses can be done using the terms variables (V) and constants (K). Let us return to the example of purchasing a closet in a furniture store. The amount (M) is equivalent to the variables (V), and the requirements (J) are equivalent to the constants (K). Each individual closet in range V represents a value Vo. The variables in range V that match the requirements set in constants K make up area E, which was previously labeled F. A variable is not necessary a phenomenon in the limited meaning of the word, such as a closet. Instead it can be almost anything we perceive.

In general two interpretations of the term variability can be used. Variability can be used to describe a change or ability to change of a construct. In this use different (evolutionary) stages of the same construct are described. This means certain elements in the construct are changing, thus changing the nature of the construct. Variability can also be used to describe the replacement of a construct with another construct. In this second use it does not describe an actual change, but rather an abstract one. Both uses of variability are applicable in the analogies and examples used in this text. A second general distinction can be made between dependent and independent variables. This can also be described as a distinction between primary and secondary variability.

The simplicity of the previous examples has to give way to a series of nuances. In the context of the example the closet is defined as a Vo. But if, for example, one were to already have a closet and was looking for a suitable room for it, the closet would be enclosed as a constant. This would be an entirely different situation. As a Vo in the shop the closet is part of a whole, whereas as a constant it is enough in itself. Additionally the example of the closet is used to illustrate the concept of the closet as a Vo. Even though in the shop there is a physical group of closets, the concept rises above the physical plane and would be equally present if there would only be one closet physically present in the shop, or there would be no shop at all.

In the examples given up to this point the variables and constants are found in two different objects. The variable can be found in the closet, and the constant can be ound in the room, or the other way around. More often than not the variables and constants are found in the same object. Returning to the example, this is the case if you have seen a certain closet in a gallery and you are looking for that particular closet in a shop. Additionally the distribution of the variables and constants is not permanent, but dynamic. As seen, a constant can become a variable when the particular closet one is looking for is found in the shop. Equally a variable can become a constant. For example, when one is in the shop and sights a closet that is so elegant that it replaces the original constant and instead one where to purchase the closet and start looking for a suitable room for it, making the different rooms the variables.

If a closet is judged as being too high or too low the judgement is height oriented, making the height the variable and the width the constant. In other words, the judgements too high and too low are operating on the same dimension, but in an opposite sense of direction. If a closet is judged as being too wide the judgement is width oriented, the width is the variable and the height is the constant. When looking at a closet and determining whether it is too slender, this judgement is based on the relationship between two factors on two levels. It is based on the relationship between the height and the width of the closet on the one hand, and the relationship between the room and the closet on the other hand.

The difference can also be seen as adding the word “Too” to the phenomenological concept. For example, describing a closet as being “Too narrow” does not create an adequate representation of the phenomenological concept Slim. This is because the relation between variation and constancy in the concept “narrow” is based in one dimension (height) and does not have two dimensions. The concept “slim” on the other hand revolves around a height – width relationship and thus has two dimensions. In other words, a figure can be described as narrow at any given height, whereas a figure can only be described as being slim in relation to its height. When something is described as being too slim, “Too slim in relation to the height” is meant. The additive “Too” gives this part which is left out away. But even this is often left out leaving only the description of being “Slim”.

3 **Analogies and Examples**

Another example of this phenomenology can be found in relationships among humans. Describing a child that has outgrown his parents in a growth spurt would naturally be described as being bigger than the outgrown parents. Instead one could equally well describe the parents as being smaller, but this is rarely done. This is because the parent’s length as an adult is considered to be the constant; the length of the growing child on the other hand is changing and therefore considered the variable.

Generally it can be said that the changing variable is the point of interest. Equally, if the parent were to grow old and become smaller, the shrinking size of the parent would become the variable. If a child looks similar to a parent, this is often described as the child looking similar to the parent. The parent is the constant with which the child, being the variable, is compared. In other words, the appearance of the constant parent is not debated, only that of the changing child. This can also be seen as the changing variable grammatically becomes the subject of the sentence.

In mathematics equality, or symmetry, can be found. In arithmetic operators the multiplier and the multiplied can be exchanged and the same end-result will be achieved. In other words, A times B will give the same end-result as B times A. This symmetry does not apply to psychology. In psychology the method leading to the end result influences the outcome. Hence, in a psychological interpretation the multiplier and the multiplied cannot be interchanged without inadvertently changing the outcome. This is caused by the distinction between the multiplier and the multiplied. This distinction between the multiplier and the multiplied is due to their different roles, as only one is the operator. Generalizing and relating this to the variables and constants discussion it can be said that the multiplied equals the constant and the multiplier equals the changing variable value. Synthesizing the examples and analogies it can be said that based on the observations made if, and to the extent that, variables and constants appear in relation to each other it can generally be hypothesised that the variables assume a primary role, and the constants assume a secondary role.

4 **Experiments**

Experiments were conducted in this line of thinking. In the experiment a group of participants were shown an image of a rectangle of which the vertical sides were longer than the horizontal sides. Mathematically a rectangle can be seen as a function of two variables (here exceptionally not meant in the phenomenological meaning of the word). The participants were given the instructions to describe in which way the given figure differs from a square. The participants were given the additional instruction that negative descriptions were not to be used. This included words such as “Different” and “Unequal”. This was done to avoid descriptions involving both dimensions and encouraging hierarchical dimensional descriptions, in other words: descriptions involving one of the two possible dimensions. This meant that the outcome was narrowed down to whether participants would choose to describe the shape as being too high or too narrow for being a square.

The result of the experiment was that as most participants described the figure as being too high. Thus, height was preferred to width as a defining dimension. Some of the descriptions given by participants were not valid as they were unclear or negative. To avoid this a follow-up experiment was done and the instruction was added that the word “Too” had to be used functionally in the answer. This narrowed the answering possibilities down to the two useful alternatives. The outcome of the second experiment was clear as all participants described the figure as being “Too high” for a square. This inadvertently shows that a dimension is preferred when describing a figure.

In a further experiment a second rectangle was presented to the participants. Whereas in the two previous experiments the vertical sides were longer than the horizontal sides, in this experiment the horizontal sides of the rectangle were clearly longer than the vertical sides. The instructions given remained the same as the previous experiments. The participants were instructed to describe in what way the given shape differs from a square. Additionally, as before, the word “Too” had to be used functionally in the answer. This narrowed the answering possibilities down to two useful hierarchical dimensional descriptions. In other words the research question was narrowed to whether students would describe the figure as being “Too high” or “Too wide” compared to a square. The outcome was that in this experiment width was preferred as a defining dimension as most participants described the figure as being too long instead of too short.

During the first experiment more often than not the longer dimension is considered the variable, and the preferred dimension when defining a figure. But the second experiment illustrated that this is not necessarily always the case. Comparing the results of the experiments, there are two elements inherent in understanding these outcomes. The first element is the relative size, meaning the relationship between the length and the width of the figure. The second factor is the position and orientation of the figure, or in other words, whether the figure is “Lying down” or “Standing up”.

These two elements are fundamental in deciding the dominant dimension. The dominant dimension is decided by the length of the dimensions and the global position and orientation of the figure. These two factors influence not only the perception of the figure directly but also each other, and thereby also the perception of the figure again indirectly. This means that a stronger preference for the variable can be expected if the elements positively influence (or support) each other. A lesser preference for the variable can be expected if the elements negatively influence each other. For example, the two longer sides of a rectangle are ceteris paribus (all else being equal) closer together than the shorter sides. This is due to the proportions and the greater the proportional difference is, the stronger this impression becomes.

5 **Prägnanz steps**

Up to this point the central focus has been the variable(s). Its counterpart, the constant, has an equally important function. As mentioned, a Gestalt will only be as good or clear as the prevailing circumstances allow. This concept is referred to as Prägnanz. Prägnanz can be described in levels of Prägnanz, called Prägnanz steps. Prägnanz steps can be described as good Prägnanzen standing out in an undetermined mass. Expertise creates more Prägnanz steps. As an experienced artist has a better eye for colours and is able to distinguish more individual colours more Prägnanz steps are created. This is expressed with the Prägnanz step density (D), which grows higher with experience. The structures in-between the Prägnanz steps are undetermined. These undetermined complexes can be experienced in two ways. They can be experienced in the frame of a nearby Prägnanz. For example a 93 degree corner can be described as an almost straight corner. Or they are experienced as ambivalent without expression.

This was also found in the experiments in which a prefect square is the Prägnanz step and the figure shown to the participants the undetermined complex. When moving away from the defined Prägnanz step on a continuum the descriptions “Too high” or “Too narrow” can be used.

Further examples of Prägnanz steps can be found going back further in the text to the first mentioned examples of the closet used to explain variability and constants. One could define the closet one is searching for as a Prägnanz step and the available closets that are rejected described as being “Too something”, or in other words, having too much of something (high, broad, narrow). But as one can also describe a closet as being too high without comparing it to a constant, this does not necessarily seem to be involved. This however, does not mean that it is not a functional element of the judgement in the background.

Zur Phänomenologie Figural-optischer Dynamik

Regarding Phenomenological Figure-Optical Dynamics

1 **The Main Experiment**

In the experiment the participants are shown nine different figures labelled in horizontal rows as 1 (a, b, c), 2 (a, b, c) and 3 (a, b, c) as shown in Figure 1.

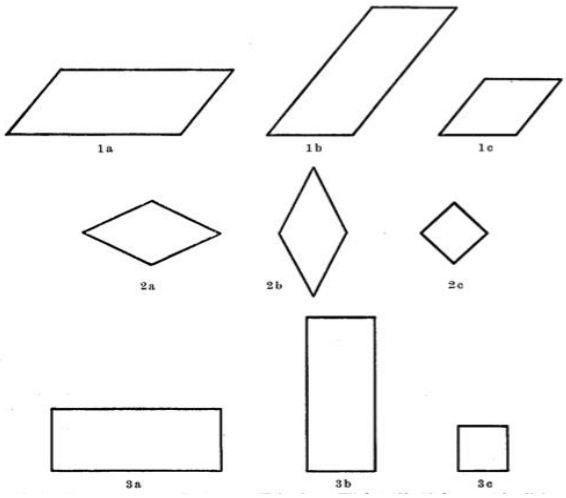

Figure 1

Figures presented to participant

Five to seven of the figures are shown to each of the 25 participants on a sheet of paper. When looking at the figures the participants are not allowed to rotate the page or move their head as to look at the figures from a different angle. For each figure the participants are asked which manipulations they would make to the figure and the reasons for the chosen manipulation. The hand gestures often used by participants to illustrate the chosen manipulation, hesitation and whether they appeared to be sure or doubtful of the given answer were noted. The answers are grouped and discussed per row and figure.

2 **Results**

The responses to the parallelogram figures 1(a, b, c) where given quick and with confidence. Out of 19 participants shown figure 1a (short vertical sides), 15 indicated that their preferred manipulation would be to “Push” the Parallelogram back into the shape of the rectangle it was before it was skewed. Out of these 15 participants 14 experienced the longer bottom side as being grounded and described the change as making the parallelogram “Stand up” again on this side. Ten participants would achieve this by rotating the skewed sides using the two bottom points as hinges, whereas the other five “Pulled” the figure back in shape by moving the two top points. Three of the four participants who did not aim to manipulate the shape of the figure back to a rectangle aim to skew the figure further until it was a single horizontal line. Just as the other participants they experience the figure to be a horizontally grounded skewed retractable, but instead of “Undoing” the skew opposed on the rectangle they aim to “Finish” it. These two positions can be described as Prägnanz steps. In presenting figure 1b the outcome was very similar to that of figure 1a. Out of the 22 participants 19 chose to “Undo” the skew opposed on the rectangle and 2 chose to “Finish” the skew making it a horizontal line. Just as with figure 1a the 19 participants experienced a grounded dimension of which for 15 this grounded dimension was height. For 17 out of 19 participants figure 1c had the same outcome as figure 1a and 1b.

In general the responses given to the three rhombus figures 2 (a, b, c) are not as prompt as for the rectangles. For two of the participants a head movement was observed which indicates the possibility that the figure was experienced as a square. A possible explanation for this is the influence of the preceding figures or the presentation of the figure. Nevertheless a vast majority of the participants experienced the figure the way it was intended: diagonally. The responses to figure 2a and 2b were very similar. For the more elaborate experiment with figure 2b, out of 22 participants 14 intended to manipulate the figure through “Pushing” or “Pulling” two opposing diagonals, thereby only changing the length proportions of the dimension.

Out of the 14 participants 11 manipulated the rhombus to be broader by matching the length of the sides. No less than 5 out of the in total 22 participants “Pulled” the rhomb “Back” into a square with a grounded side. In contrast to the parallelograms this transformation influences both dimensions of the rhombus in order to change the figure. In describing the manipulation the term rectangle was used by 9 of the 14 participants.

The responses to the rectangles were remarkable. The answers given to all three rectangles are given with considerable hesitation. More than just a difference in speed, participants were not certain of the answer they provided. In general the figures are experienced as less “Tensioned”. Therefore the manipulations participants indicated were not as unanimous and often preceded and followed by expressions such as “I think”, “Maybe” or “For example”. This does however not necessary mean that in rectangles no descriptive variability is present. Most of the participants indicated that they thought the surface of the figure had to remain the same, but if they had known this was not the case this would have been the answer given. Other participants reacted in an opposite way and instead of hesitation they provided several possible manipulations quickly following each other. This is an indication for the same psychological state as the participants showing hesitation.

When presenting the participants with figure 3a, 14 out of the 15 participants quickly decided to rotate the figure by 90 degrees. For 11 of these 14 participants the manipulation was achieved in a horizontal direction. This does not indicate a preference for the horizontal dimension, but instead shows a preference for the longitudinal dimension as the main dimension. In response to figure 3b half of the 20 participants indicated they would not manipulate the shape of the square, but would only rotate it by 45 degrees to create a horizontally grounded dimension. The second most given answer with 8 of the 20 participants is a similar diagonal mutation as in 2a and 2b. When presented figure 3c out of the 19 participants 13 indicated not wanting to manipulate the figure. It is hypothesised that the remaining participants who did suggest a manipulation did so because of the “Tension” passed on from the preceding figures.

Note that in general as opposed to the previous figure most participants chose to change the position instead of the shape of the figures.

In 7 out of the 8 presented figures, with figure 2c as the exception, participants showed a statistically significant preference for a phenomenal variability. In the parallelograms 1(a, b, c) this consisted of a preferred manipulation into a rectangle with the height or skewed side as constant. For the rhombus 2(a, b, c) this preferred manipulation consisted of diagonal stretching or compressing. In the rectangles for 3a and 3b the preferred manipulation consisted of lengthening or shortening in the side parallel direction. In the last figure no change was preferred. The summarized results and relative percentages are shown in Table 2.

Table 2

Results and relative percentages

Figure Nr.	Preferred Figure variation	Relative percentage
1a	Restore to rectangle with the skewed side or height as constant	15/19 = 0.79
1b		19/22 = 0.86
1c		17/19 = 0.89
2b	Diagonal aimed stretching or compressing	14/22 = 0.63
2c	Like in 2b	8/20 = 0.40
	Rotating onto side	10/20 = 0.50
3a	Lengthening or shortening in the side parallel direction	14/15 = 0.93
3b	Lengthening or shortening in the side parallel direction	9/15 = 0.60
3c	No change	13/19 = 0.68

3 **Analysis**

There are limitations to the schemes of Variability and constants of the natural dimension. If one reduce the analysis to rectangles as done in *Variability and Constancy as Phenomenological Categories*, one might be tempted to assume that the variability found in rectangles can unconditionally be transferred to other figures. This assumption would be wrong as not every figure is dually structured, and even if a figure is dually dimensioned it can still differ in at least two ways. For example figure 2b shows that in a rhombus the secondary diagonals to the main dimensions are not necessary constant as in most rectangles, but instead can also be (co)variable. The preferred manipulation of figure 2b is similar to the manipulation of figures 3(a, b, c) in that it goes in the direction of one of the two natural dimensions and making it the main dimension. Even though figures 1(a, b, c) show that one has to be careful with this assumption as it is not as clear as in the case of the rectangles. The similarity between an parallelogram and a rectangle will increase as the size of the dimension facing the skewed dimension becomes longer. Hence, this causes it to be experienced as the main dimension.

4 **The Second Experiment**

One of the biggest findings of the first experiment has not been looked into enough yet: the fact that when presented with the rectangle 3c most participants at first did not wish to suggest a figure manipulation. A second experiment with new participants was done according to the following methods. The 18 participants were presented Figure 2 as shown.

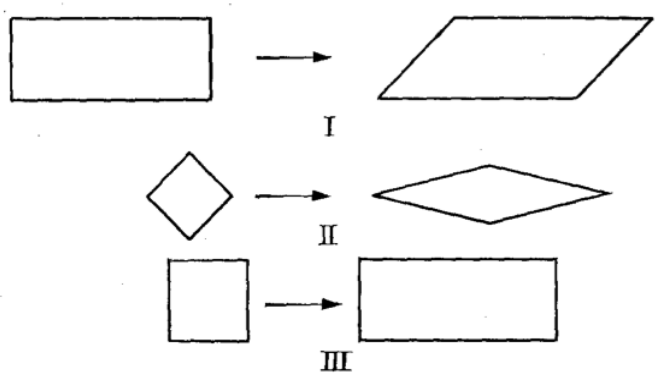

Figure 2.

Figure presented to participants

They were instructed to image the figure on the right-hand side of the arrow was created out of the figure to the left hand side of the figure through a given manipulation. They were asked to indicate which of the three manipulations was most forceful and explain why. The outcome was that 13 of the 18 participants experienced change III as the most forceful. In the explanation of their choice all 13 participants indicated that opposed to manipulation I and II a drastic increase in surface in needed to achieve manipulation III. Even though differently phrased their answers were unanimous that manipulation I and II are in essence a “shift” of

substance whereas in change III is in essence a “change” of substance. Compared to the first experiment the outcomes found with different methods show the same structure lying underneath. In both experiments participants are hesitant to change horizontally oriented rectangles and squares. And in both trials participants indicate that the surface change is essential, emphasizing the quasi-material experience of the figures. This indicates that the figures in both experiments were experienced as quasi-material structures.

The general “Tension” experienced and described by participants in these figures and the resistance to making changes to certain rectangles and squares can better be expressed as opposites on a spectrum than as contradictions.

Mathematically these opposites could be represented with positive and negative values with in between them a neutral zero (0) point which holds no tensions urging manipulations and no resistance to change. In general three categories of virtual figural manipulations can be distinguished: 1) structural advanced manipulations, 2) structural adequate manipulations and 3) structural inadequate manipulations. These three can be compared to encouraged, permitted and prohibited changes. The “Un-skewing” of a parallelogram is an example of an advanced change, changing the length of a side dimension of a rectangle is an example of an adequate change and the diagonal change of a side parallel structured rectangle is an example of an inadequate change. In this categorisation advanced changes are a subversion of adequate changes, meaning that every advanced change is an adequate change but not every adequate change is necessarily an advanced change. These three categories can be approached through the concept of Prägnanz. The parallel sided square is the prägnant figure, and the horizontally grounded parallelogram is derived from this Prägnant figure. In this context Prägnanz steps can be identified, such as the square among rectangles and parallelograms.

Zum Problem der Ähnlichkeit

Regarding the problem of Similarity

1 **The main experiment**

In the experiment the 20 participants from different backgrounds and education are presented three rectangles (Labeled A, B and C) of different proportions. A is 1 by 3 cm, B is 2 by 3 cm, and C is 1 by 6 cm as shown in Figure 3.

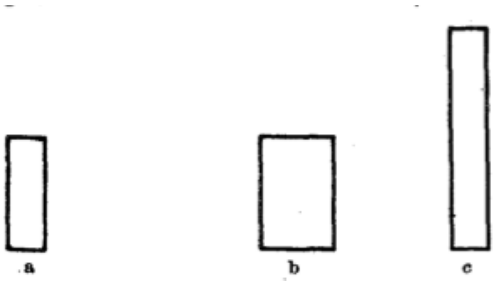

Figure 3

Rectangles presented to participants

Notice that A and B have the same height but a different width and A and C have the same width but a different height. The participants are asked which of the two figure couples (*A and B*) or (*A and C*) are more similar. For half of the participants the order of the figures is A – B – C, for the other half of the participants the order is A – C – B. The participants are encouraged to speak freely and make a decision based on their first impressions. The outcome is that 18 of the participants replied within 2 seconds and with certainty that (*A and C*) are more similar then (*A and B*). The outcome of the first experiment is that most people judge (*A and C*) to be more similar than (*A and B*). To explore the factors influencing this judgment further experiments are done.

One needs to focus on comparing the conditions in which the decision is made, especially the objective-figure ones, to ensure that the existing similarities between (*A and C*) are the only objectively possible reason for the observed higher similarity. This was to some extent done in the previous experiment by placing *B* and *C* close to *A* an equal amount of times (10). Additionally both *B* and *C* are both rectangles, have the same surface size, are both vertically oriented and both have one dimensional length in common with *A*. Additionally the proportion difference of the surface of *A* (3:1) and *B* (3:2) is identical to the proportion difference of the surface of *A* (3:1) and *C* (6:1). For other possible factors that could influence the judgement similarity one needs to look at the differences between the similarities *B* and *C* have with *A*. The first possible factor is the proportional length of the side in common with *A*, being the long side (*B)* or the short side (*C*). The second possible factor is the orientation of the dimension in common with *A*, being vertical (*B)* or horizontal (*C)*.

These two possible factors can be experimentally tested by repeating the experiment and turning all three figures by 90 degrees, changing the length and orientation of the figures. There are different ways of presenting the turned figures. In the first set up the turned figures are presented vertically underneath each other as shown in Figure 4 In the second set up the turned figures are presented horizontally underneath each other as shown in Figure 5.

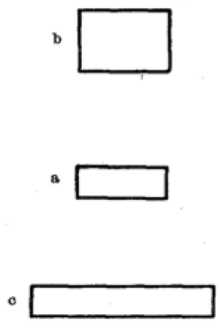

Figure 4

Rectangles presented to participants vertically

Figure 5

Rectangles presented to participants horizontally

In both experiments figure *A* is placed between figure *B* and *C*, so that the distance between (*A and B*) and (*A and C*) is identical. The outcome of first set up is that out of 28 participants 18 judged (*A and C*) to be more similar than (*A and B*), whereas 10 participants judged (*A and B*) to be more similar. The outcome of second set up is that out of 30 participants 18 judged (*A and C*) to be more similar then (*A and B*), whereas 12 participants

judged (*A and B*) to be more similar. Across both experiments 3/5 of the participants judged the figures as more similar if they shared the length of the short side. When combining the balances of 2 : 1 and 3 : 2 from both experiments, this is a chance of 7:4 across the experiments.

3 **Congruity in the descriptive constant dimension**

To combine and explain the findings of the three experiments one needs to look at the connection to the subjects discussed in the paper *Variability and constancy as phenomenological categories*. (See...) In this work an experiment is described where participants are shown an image of a rectangle of which the vertical sides are longer than the horizontal sides. The participants were given the instructions to describe in which way the given figure differs from a square. The outcome was narrowed down to whether participants would chose to describe the shape as being too high or too narrow.

The result of the experiment was that most participants described the figure as being too high. This inadvertently shows that there is a preferred dimension when describing a figure.

In a further experiment a second rectangle was presented to the participants of which the horizontal sides were longer than the vertical sides. The instructions remained the same. The outcome was that width was preferred as a defining dimension as most participants described the figure as being “Too long” instead of “Too short”. During the first experiment more often than not the longer dimension was considered the variable and thus the preferred dimension when defining a figure. But the second experiment illustrated that this is not necessarily always the case. Summarizing, two elements can be withheld. The first element is the relative size, meaning the relationship between the length and the width of the figure. The second factor is the position and orientation of the figure, or in other words, whether the figure is “Lying down” or “Standing up”. These two elements are fundamental in deciding the dominant dimension.

As the same two factors were found to influence the judgement of similarity these two factors can be combined to one factor called ”The descriptive constant dimension”. The similarity in the descriptive constant dimension between two figures is what determines our impression of similarity. The descriptive constant dimension consists of two elements, the similarity in the short dimension and the similarity in the horizontal dimension. When determining the dominant dimension in a single figure or comparing two figures usually, and preferably, both elements are involved. This is not a necessity as in both situations one of the elements is sufficient. When comparing two figures similarity always based on similarity in the constant dimension. The variable dimension is always of different length between the figures. In theory, as described in the previous paper, changing the variable should have little influence of the judgement of similarity. Looking back at the experiments this does seem to be the case. The length of the variable dimension (The vertical dimension of *A* and *B*) had little influence on the judgement of similarity.

4 **Discussion**

The previously described factors can also be seen as requirements or independent variables (Variability should here be understood as objective methodological instead of phenomenological).

The dependent variable *U* representing the biggest similarity between to figures can be depending on two independent variables x and y expressed as: $U = F(x, y)$. Defining x as the objective similarity between the two figures in the short dimension and defining y as the objective similarity between the two figures in the horizontal dimension. In other situations the dependent variable *U* can depend on only one independent z (similarity in the constant dimension): $U = G(z)$. As z itself is a function of both x and y : $Z = f(x, y)$, *U* can be represented as a function of x and z: $U = G[f(x, y)]$. Both x and y are binary variables and can independently have the value yes (1) or no (0). Variable x has the positive value (1) if both figures are equal in the short dimension, and the value (0) if they are not. Variable y has the positive value (1) if both figures are equal in the horizontal dimension, and the value (0) if they are not.

This way the outcome of the experiment can be described as chances of a situation occurring, demonstrating Z is deducted from U (note that similarity could be used as a deducted value and variable in a psychological model). This is shown in Table 3. In contrast to x and y, U and Z are considered to be phenomenal.

The proof for $U = G(z)$ is given. As often in psychology, after replacing multiple objective independent variables by one new phenomenological variable the similarity problem can be traced to the Variance and constant problem. However, as the first experiment (where some participants chose (*A and B*) to be more similar) demonstrates, the dependency of *U* on x and y ($U = F(x, y)$) is not satisfactory proven.

Table 3

Statistical proof Z is deducted from U

U = F(x, y)	Chance	Based on	Z = f(x, y)	Meaning Z = f(x, y)
U11	18/19	(a, c) I	Z11 = f(1, 1)	Short and horizontal dimensions are equal
U10	2/3 - 3/5	(a, c) II + III	Z10 = f(1, 0)	Short dimension is equal
U01	1/3 - 2/5	(a, c) II + III	Z01 = f(0, 1)	Horizontal dimension is equal
U00	1/1	(a, c) I	Z00 = f(0, 0)	No dimensions are equal

That the descriptive constant dimension is fundamental in our judgement of similarity is also reflected in the reasoning given by the participants for their choice. Summarizing, the reasons given by the participants following variances and constant combinations can be distinguished. In the second experiment (*A and C)* are both horizontally oriented and *B* is vertically oriented, or (*A* and *B)* are both vertically oriented and *B* is horizontally oriented. Note that both variability and constants are used in the positive sense of the word, they do not negatively influence each other.

During these experiments the relationship between the variance and constant problem and the problem of similarity has only been demonstrated for the circumstances used in the experiment. In the theoretical analysis of the experiment the focus was only on the matching properties (Shape, Size, Length) between the individual figures, and only briefly on their opposing locations. Location and orientation has a influence on similarity. This was for example done by creating an equal distance from figure *A* to figure *B* and *C* and presenting the figures in two different orders based on their orientation.

Z needs to be defined as a function of at least 3 variables by adding the variable of relative position to x and y. This third variable will not be explored in this work in detail, though unintended the second and third experiment indicate the importance of this factor. Looking at the outcomes in retrospect in Table 4 it can be seen that for 10/28 people, which equals roughly one third, the relative position of the figure influenced the judgement of similarity.

Table 4

Results of experiment

In both experiments A similar to C	12
In both experiments A similar to B	6
In II for A similar to C, in III A similar to B	4
In II for A similar to B, in III A similar to C	6

Einzelgegenständlichkeit als phänomenale Eigenschaft

Single-Objectivity as a Phenomenological Property

1 **Isolation**

This work aims to answer three questions. What effects can the isolation of parts, or isolation of the parts, of a complex give? What can be meant with isolation in this context?, and which (theoretical) conclusions can de drawn from the possible effects? These questions are framed in the Thesis by von Ehrenfels "On Gestalt qualities" (1890). In order to isolate elements von Ehrenfels proposes a surprising solution: he asks the reader to image to imagine the elements t1, t2, t3…of a phenomenon created by consciousness *S* to be divided among *n* consciousness pieces s1, s2, s3... and so on. In the isolation described by von Ehrenfels there are cases (*A*) in which something is lost that was realised in the total phenomenon. Von Ehrenfels also defines cases (*O*) in which consciousness *S* creates more than the elements combined. Von Ehrenfels defines the complex in its total as a Gestalt and the disappearing quality a Gestalt quality.

Thesis *O* and A appear to be identical only formulated in opposite directions. However this is not the case. The reciprocal formulation of *A* would be (*A´*): That when combining *n* separate single phenomena into consciousness *S* something new is created. The reciprocal formulation of *O* would be (*O´*): That when *n* individuals with each a *T*i (i = 1, 2, …*n*) produce less when added than a consciousness *S* with the totality of the *Ti´*s. Additionally, instead of describing the process as being more or less, the terms "Newly created qualities" and "Lost qualities" are more appropriate. Whereas the terms created qualities and lost qualities apply only to Gestalt-qualities, being more or less is used to describe a change in any complex. For simplicity the terms "More" (*O*) and "Lost" (*A)* will be used.

2. **Historical and Factual**

The two questions asked are from a psychological-historical (*H*) and factual (*F*) perspective. Did von Ehrenfels intend to describe *A* and *O* as being equal? And are they equal? In answering *H* the answer needs to be deducted as von Ehrenfels never posed the question. Given the fact that he works with term "More" indicates that aside from the added Gestalt quality (*g*) the phenomenological elements on both sides of the comparison are assumed to be equal. Or in other words, if something (*G*) is (*g*) more than a certain (*F*) it can only mean that *G* and *F* are equal if *g* is left aside. Mathematically it can be deduced that: $G = F + g \rightarrow F = G - g \rightarrow g = G - F$. In these formulas *G* represents the Gestalt, *F* the fundament of all *T*i´s added and *g* the Gestalt-quality. One could use two symbols for *F*, being *Fg* and *Fis* to indicate whether *F* is isolated or appears in the contest of *G*.

The question (*F*) whether they are equal is often debated. In a melody the single notes (*t*i) undergo a change after isolation. Additional separate part properties can be identified that are found in certain parts of the melodies, such as the leading tone and keynote. These part properties are existentially linked to the Gestalt quality but are phenomenologically and logically distinguished from it. The formulation of von Ehrenfels "The sum is more than the parts" is to be replaced with "The sum is different than the parts".

If one were to try and defend the thesis of von Ehrenfels one should state that when one acknowledges the phenomenological existence of part-properties the same procedure used to prove the existence of Gestalt-qualities can be used to prove the existence of part properties. When the *t*is are isolated both the Gestalt qualities and the part-properties are lost: $F = G - g - r$, in which *r* is the totality of the *ti*´s. Mathematically the function would be extended to include the Gestalt-quality and the part-properties: $F = G - (g, r)$ or $g + r = G - F$ which equals $(g, r) = G - F$.

In this logic one unspoken requirement is left unfulfilled. It is silently assumed that Gestalt qualities and part-properties are the only properties existing in relationship to isolation.

Instead additional *t*i properties emerge as the result of the isolation process. These are referred to as the single object properties (*e*i) of the involved *t*i. This means that in the process of unification (the opposite process of isolation) and isolation properties are not only lost, but also formed. In the process of isolation there are at least three type of properties that are existentially linked to their carrier. In the process of unifying the Gestalt-qualities and part-properties are existence gaining, and the single object properties are existence losing. In the process of isolation this is the other way around.

3 **Single Object Properties**

Additionally there are properties that neither lose in the process of isolation of their carrier and have them before the unification of their carrier. Metzger (1954) refers to these properties as "Brought along". Examples of these properties are colour, intensity and size. In the loss of *g* and the *r*i in the isolation the *t*i do not only have brought along properties. As this is not possible new single object properties are created. The essence of von Ehrenfels theory is the assumption that the foundation *F* serves as a unchanging basis for constructing Gestalt-qualities and part-properties. Mathematically the formula now needs to be expanded to $F = G - g - r + e$, or restructured $G = F + g + r - e$. In which represents the collection of *e*i´s. This does not stroke with the notion that a Gestalt is not only more than the fundament (as used by von Ehrenfels and represents of the Graz tradition), but also less as single object properties are lost.

The single object properties can identify and express three different forms of isolated *t*i. It can be a) enough by itself and thereby fulfilled, b) uncompleted and in need for complement or c) lost and expressing the isolation of the *t*i. All properties are best observed in transition stages, but in the case of *a* the property can be subtle and changes difficult to experience. As an illustration of the three types the example of the melody is used. An isolated note is experienced as isolated, and in general will have the character of being enough by itself. There are also cases in which the tone is experienced as incomplete, for example if it breaks with the leading tone. The "Being lost" experience distinguishes itself from a "Being enough by itself" experienced in that the isolation is experienced as a shortcoming. The difference between the "Being lost" experience a "Incomplete" experience is that in the "Being lost" experience no completion can be named.

Das Eigenschaftsproblem in der Gestalttheorie der Wahrnemung

The Property Problem in the Gestalt Theory of Perception

1 **Properties and Carriers**

A handbook has two important tasks. The first is to systematically represent the subject and the second is to provide a summary of the available literature on the subject. Because of the heterogeneity of the literature the emphasis in this chapter lies on providing a systematic representation of the subject and the literature is used for references and examples.

As an introduction to the topic Rausch invites the reader to imagine two situations. In the first seeing a red ball, and in the second seeing complete darkness. In both situations the visual system is used but only in the first situation you see a figure. The difference between the two situations is the difference between an inhomogeneous and a homogenous visual field. In an inhomogeneous visual field figures are seen as outlined units which make them appear on the background. These figures carry certain properties. According to the original Gestalt theory properties can only be carried by these figures. But in a broader concept, properties can also be carried by things such as the background. When a property is carried in this broader concept the carrier of the property is a material instead of a figure. The material can be part of a figure but does not necessarily have to be. It is possible for a material without a figure to carry properties. Examples of this are the properties we attribute to materials such as gold and silver. There are other carriers that are neither a figure nor a material such as lighting and texture. These can also be carriers of properties in the broader concept because they can be part of an outlined figure but they do not necessarily have to be. Because in the Gestalt theory the word property is only used for properties that are carried by figures, all properties carried in the broader concept are called qualities. In other words, every property is a quality but not every quality is a property.

There are two reasons why the shape of a figure is more important in determining the Gestalt than the material the figure is made of. First a shape can be expressed without material, but material always has a shape. Secondly changing the shape has a stronger implication for the perception of the figure than changing the material it is made of. Because of this, if the material is part of the figure it is not considered to be the carrier but an additional property of the figure.

A distinction is made between properties that are inherent to a figure and properties that are not inherent to a figure. Conditional-genetical properties are properties that are inherent to a figure and cannot be removed. Phenomenal properties on the other hand are properties that are not inherent to a figure but are attributed to it at a moment in time. Phenomenal properties are often unspoken and can be passive at one moment and play a crucial role during another moment. In other words these silent assumptions can become loud assumptions. A side note here is that properties have been discussed as independent entities although they depend on a figure in order to exist. The entire topic can be approached in an entirely different way. Instead of viewing properties as primary and the observations as derived from these properties, the properties can be seen as derived from observations.

To translate this to the example of a geometrical optical illusion: the perceived illusion can be seen as a property of the figure or as a relationship between the figure and the background. Because a certain geometric alignment will lead to a particular illusion, it is a conditional-genetical property of the illusion. This concept can be expanded to the relationship between the figure and the background. The relationship between the background and figure can also be described as a property of the field or as a relationship between the figure and the background. Despite the tendency of people to attribute the properties to the outlined figure both descriptions are acceptable, and can be offered alongside each other.

A possible property is reality. For this it is important to clarify the exact meaning of the concept real. A distinction is made between the physical world around us and our experience of this world. These are not necessarily the same. Indicators of this are comparing the perceived against the imagined, something in contrast to nothing, and fullness in contrast to emptiness. The question is whether this concept can be used as a property? As psychology is confronted with the physical and the experienced world it should take both into account.

Properties can be divided in four groups: Structure, Nature, Entity and Essence properties. All of them will be described with examples. The first type is structure properties. Structure properties enclose all properties that relate to any kind of transition. This can be in many forms such as construction, rhythm, melody and the trail of movement. Examples are round, closed, rising growing. The second type of properties are nature properties. All properties that are material related fall in this group. Examples are transparent, shining, smooth or soft. The third group consists of entity properties. All properties related to physiognomy fall in this group. Examples are proud, peaceful, childish and elegant. Two types of entity properties are distinguished: real entity properties and unreal entity properties. Theoretically the distinction is based on how they are linked to their carrier, but in practice it is often impossible to make a distinction between the two. Next to these three groups a fourth group is distinguishes called vigor or essence properties. These are described as having a direct influence on the construct. Examples are attracting, calming, arousing or frightening. So far we have mostly spoken about structure properties.

The connections and coherences between the different types of properties are important in understanding the interactions between them. Several structure properties are required to enable a material property. A good example is the material property transparency. Essence properties can express themselves in structure, entity and essence properties.

A complex is a singular structure containing multiple properties. This indicates that the concept of a property has multiple functions. It is the difference between structure and structure properties. Whereas a structure always contains structural properties, structural properties are not necessarily linked to a structure. They can be properties of a structure, but they can also be properties of a structural property. In essence the same distinction applies to the relationship between nature and nature properties.

There are two exceptional properties. The first is the hierarchy and weight distribution of the elements in a phenomenal construct. Important when describing this is the relationship between the variability and the consistency, or VC relationship. This relationship is based on the variables and consistencies in the construct. As a second exceptional property emotions are categorized as nature properties. This is because the concept of emotions is used in the narrow sense in which it is part of the observer's environment. Later on it will be done in the broader sense in which it is permitted as an element of the observer. This will be explained in more detail further on.

2 **Complex Carriers and Complex Qualities**

Complex qualities are a distinct kind of quality that requires a complex carrier. An example of a complex quality is a melody. The example of the melody and its musical components is used throughout the papers written by Rausch. A melody is a composition of separate tones which when heard by themselves do not reveal the melody. A complex carrier, or complex, that possesses certain properties such as the earlier mentioned conditional-genetic or phenomenal properties is considered a Gestalt. These properties are referred to as Gestalt qualities, or in other words qualities that identify a Gestalt. This implies that a complex is subordinate to a Gestalt. Or in other words: every Gestalt is a complex, but not every complex is a Gestalt.

But as shown in the musical example the melody is not given to brain at once, but one note at a time. This leads to a problem when identifying conditional-genetical aspects on the level of Gestalts and on the level of Gestalt-qualities.

A complex is a requirement for a complex quality. But this alone is not sufficient. A complex quality only exists if a complex with the necessary fitness is present. This fitness is graded on a continuum called clearness or sensibleness. As a complex becomes clearer and more sensible it becomes more likely that a complex quality is present and the figure is considered a Gestalt. Translated to the musical example separate tones combine to a melody as much as the necessary fitness allows. But in practice sometimes no clear line can be drawn between a complex and a complex quality as there is no grading scale for fitness. Complexity describes the amount of elements in a complex, a high complexity indicates that a complex has a lot of elements. If there is a phenomenon with a high complexity which the observer is familiar with, it becomes of higher value than another phenomenon with a lower, equal or higher level of complexity but with a lower level of organization, or familiarity. This is expressed in the concept of Gestalt height. It is constructed of the combination of the organization and complexity of a Gestalt. In other words, a pile of sand has less Gestalt height than a tulip or a tree. Gestalt height is seen as the fundament of what we experience as aesthetics in music, art and poems. In explaining aesthetics the dualism of organization and complexity the mathematician George Birkhoff created a formula to measure aesthetics. The formula is M = O/C, in which O stands for Organization, C for Complexity and M as Measurement for aesthetics.

3 **Observer and Environment**

In Gestalt psychology a distinction is made between an observer and the environment surrounding the observer. The observer and the surrounding environment are referred to as the complete field. Up until this point the underlying assumption has been that the figures carrying properties are part of the environment.

This is not necessarily true. The focus can be leaning more towards the observer or the environment, or can be equally divided between the two in which case they are experience coordinated. When describing the observer a distinction is made between an active and a passive observer. The active observer embraces the figure, whereas a passive observer simply experiences it. In both cases properties can be attributed to the observer and the surrounding environment in the same way it is done to figures. For example, in a state of depression or euphoria everything in the environment is experienced this way and reflects it back. As it is reflected back it is also an example of how the observer and the surrounding environment interact and become experience coordinated.

An optical example with three dots illustrates how properties that depend on the observer and properties that do not depend on the observer can be present in the same complex. Suppose one of the three dots is between the two others in the middle. Because the dot is always in the middle no matter how you turn the image this property does not depend on the observer but is founded in the image. If there is a dot on the right and a dot on the left these properties are depending on the position of the observer and change as you turn the image.

As described so far there is a controversy. The body of the observer is seen as a part of the environment because just as the surrounding environment it is a source of the experience. But at the same time the observer is distinguished from the environment. This problem can be solved with a reductionist view on in which there are two parts to the observer. The first is the body which is part of the environment with objective-phenomenal properties. The second is the central point located in a straight line between the eyes.

4 **Whole and Part Properties**

One of the biggest achievements in Gestalt psychology was the transition from studying Gestalt-qualities, which are the fundamental theory of Gestalt psychology, to newer Gestalt theoretical ideas of whole properties and part properties. There are similarities and differences when comparing the studies of whole and part properties to studies of Gestalt-qualities.

The fundamental theory of Gestalt-qualities was based on the newly discovered Gestalt-qualities. These were seen as new forms of physical entities and the focus was proving the existence of these newly discovered entities. The study of whole and part properties on the other hand is based on the concept of a functional structure. It makes the assumption that a Gestalt has whole and part properties: properties that relate to the whole Gestalt and properties that only relate to a part of the Gestalt.

An asymmetry is created as the term Gestalt quality is replaced with the two terms whole and part properties. This asymmetry would be solved if there was an equivalent to what are now called part properties. Though not recognized as such, there has been a concept equivalent to part properties. In 1906 Schultze introduced the concept effect accent. The effect accent is described with three characteristics: immediate, vivid and dependent. These three characteristics make it a content-related equivalent to what are now known as part properties. Even though the term Gestalt qualities has been replaced with the terms whole and part properties. It is acceptable to still use the term Gestalt qualities. As in many other scientific fields it is often necessary to use concepts that have been replaced for the purpose of explanation. It is not necessary to always discuss the part and whole properties at the same time. Sometimes it is even necessary to discuss them individually.

A Gestalt is created when elements combine to a complex and disappears if they are separated. But it is unclear whether Gestalt qualities should be seen as an object or as an attribute. A second significant progress has been made in fully acknowledged Gestalts as an attribute: a whole property that is complemented by correlative part properties.

In the musical example a series of notes has whole properties, such as the melody, and the separate notes have part properties. Just as the whole property these part properties are not limited to instances where we have a specific name for them such as a key or leading note in a melody. As there are countless melodies there are countless part properties. After all they shape the experience of the melody at any given point. When the part properties change, the whole property always changes alongside with them.

System dependency illustrates the influence of the whole on the parts. A spatial example of the influence of the whole on the parts is the orientation of left and right, front and back. These are properties of parts of the whole but are given to the parts by the spatial orientation system of the whole. The beginning, middle and end of a melody are determined by two systems. The first is the arrangement of the notes; the second is the tonality. There are also examples in which more than 2 systems determine the outcome. An example is the ouverture of a melody, which is determined by at least three systems: tonality, tact and the timely arrangement.

In optical Gestalts three groups of properties that influence the parts are distinguished. All three groups will be briefly described. The first group consists of absolute or relative properties. Examples of relative properties are small versus big and fast versus slow. The second group consists of whole properties. These show to the observer whether an object is standing up or lying down. Indicators for this can be the peeks of mountains or the base of objects. The last group consists of system-dependent part properties.

These are part properties that depend on the system. In the example of the melody a system-dependent part property would be the base tone of the notes. The base tone is independent of the order of the notes but at the same time depends on it for actualization. Taking these ideas to a broader concept the beginning, middle and end of a melody constitute different parts of the Gestalt. This implies that the Gestalt is a whole. But if you only see a few of the notes by themselves you could not know it belongs to a melody. This would suggest that every element we see is part of a Gestalt, even if it is not immediately visible to us.

5 **Gestalt Criteria**

Gestalt Criteria are criteria a complex needs to fulfil to be considered a gestalt. Two main criteria are used. The first is that the total has to be more than the sum of the parts. The second is that the Gestalt has to be transferable. A example that would fulfil both criteria is a melody. It is more than the sum of the parts and as a melody can be recognized even if the pitch or speed has changed the Gestalt is transferable.

The first criterion is used to define the difference between a Gestalt and a sum of parts. If a group of elements can be created by adding one piece at a time without changing any of the pieces in the process the total is not more than the sum of the parts. This is also valid the other way around. If pieces can be removed or isolated, one piece at a time without any of the remaining pieces changing in the process, the total was not more than the sum of the parts. In both cases the first requirement for a Gestalt is not fulfilled.

The second approach is used for an analysis of different arrangements of a complex. By isolating one part at a time from a complex he observed whether the nature of the remaining and isolated parts changed. The result were 744 cumulative and 744 noncumulative concepts. These are used to describe the variation and isolation of parts of a phenomenon. Even though Rausch looks at selecting one of the 744 noncumulative concepts to best describe the variation and isolation of parts of in a phenomenon the cumulative concepts can also be used to describe certain aspects of a Gestalt. Noncumulative concepts are used when describing variations in a phenomenon and the cumulative concepts are most suited to describe the isolation of parts. The cumulative and noncumulative concepts also describe phenomenal constructs such as time and space. Because these constructs enclose properties themselves you can also get properties of properties.

Can the two Gestalt criteria be traced back to the cumulative and noncumulative concepts? The first criterion of the total being greater than the sum of the parts cannot be explained by the cumulative and noncumulative concepts because the two schemes are fundamentally different in one aspect. The cumulative and noncumulative concepts enclose dynamic changes, whereas the Gestalt criteria are dichotomous. In other words: there are only two options, either it does or it does not exist. This absence of change is a fundamental weakness in the two Gestalt criteria. The second criterion of transferability can be explained by the cumulative and noncumulative concepts. To do so the focus moves from the parts of a complex to the entire complex. In doing so the changes are not limited to a part of the complex but the total complex can be subject to a change. Transferability can be traced to the cumulative and noncumulative by the existence of invariance in the entire complex against variation of all parts.

6 **Isolation**

The concept of isolation is defined as the separation of individual parts. In this view the best way to isolate elements of a complex is by spreading them across several individuals. There are four characteristics that describe isolation in a complex. These are the number of individuals that the elements of a complex are spread over, the time between the parts, the used modality and spatial distance. In this concept the possibility has to be ignored that an isolated element could combine with other elements and form a new element, complex or Gestalt quality.

The isolation of parts does not just lead to the loss of properties. Instead they are transformed into, and replaced by, new properties. In the musical example when enough notes are taken out of a melody, the melody will be lost but the isolated notes will keep their natural properties. These natural properties are known as single object properties. After an element is isolated single object properties can appear in different ways. They can appear independent and calm, incomplete and looking for completion, lonely and by itself or it does not fit in its surroundings.

A complex is created when elements combine and disappears when elements are isolated. This concept of gaining existence (being created) and losing existence (disappearing) is described by the term existence dependency. Whole properties are existent dependent as they are shaped by combining elements and transformed by the isolation of elements. The last named single object properties are complementary to whole properties in this regard. Single object properties are created when whole properties disappear, and disappear when whole properties are created. As a counterpart to the existence dependent properties there are also existence independent properties. These do not follow the cycle of change and can be described as stable and “brought along”.

The term “Gestalt Quality” now has two meanings. The first is as an attribute. The second is as it is described in the context of isolation as a potential new element. Different opinions exist about the terminology but in this text the term Gestalt quality is used as an attribute in a moment of direct observation.

Looking closer at the example of the melody, there are several aspects that characterize a melody. Some of these characteristics are more important than others in recognizing the melody. It is easy to recognize a melody if the volume has changed but when the order or pitch of the notes change it can become difficult if not impossible. This results in a hierarchy of characteristics. One of the most dominant characteristics at the top is the inter-variation of the melody.

There are two forces at work when recognizing a melody: the aspects that work to maintain the melody (I) and aspects that break down the melody (II). The transposition is determined by four characteristics: the consistency and variation in the parts (I) and the consistency and variation in the parts (II). There is an important similarity between melodies and figures. In much the same way we can recognize and match two melodies if they are played in a different pitch and at a different speed, we are able to correctly match figures of different sizes and colours. This shows that in both examples the total is more than the sum of the parts. Or in other words: it is a Gestalt.

7 **Prägnanz**

A Gestalt will only be as good or clear as the prevailing circumstances allow. This concept is referred to as Prägnanz. The word Prägnanz is related to the word pregnant which is defined as heavy or full of something. Synonyms that can be used in the context of Gestalt theory are simple or regular. It is classified as a property of the Gestalt and has as primary functions the clarification and classification of properties. It can also be used for analysing problems in Gestalt psychology.

A Gestalt complex contains certain properties that distinguish it from other complexes that do not possess these properties. Or in other words: Prägnanz is relative because the regularity seen in the carrier exists in comparison to the carriers surrounding it with less regularity. It is a competition and the complex with the highest Prägnanz wins to go on and shape the Gestalt. A big step forward can be made if the relationship between Prägnant and non-Prägnant carriers is determined.

Prägnanz is described in levels of Prägnanz called Prägnanz steps. Prägnanz steps are for example tones in the tone ladder. They can be described as good Prägnanzen standing out of an undetermined mass. The structures in-between the clear tones are undetermined. These undetermined complexes can be experienced in two ways. Either they are experienced in the frame of a nearby Prägnanz. Or they are experienced as ambivalent without expression. An example of an undetermined complex experienced in the frame of a nearby Prägnanz is a 93 degree corner described as an almost straight corner. Prägnanz steps can be symbolized as shown in Figure 6. The biggest rectangles in the middle represent Prägnanz steps and the smaller rectangles around them represent the different ways the complexes near the Prägnanz steps can be experienced.

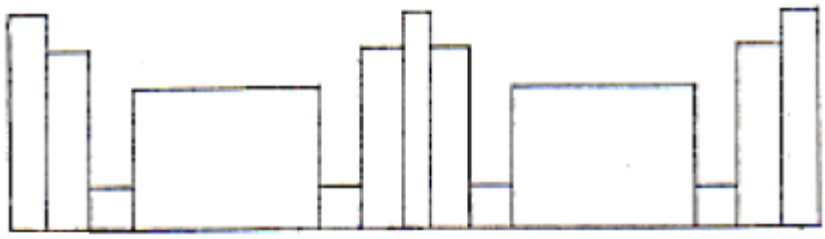

Figure 6

Prägnanz steps symbolized as rectangles

Expertise creates more Prägnanz steps. As an experienced artist has a better eye for colours and is able to distinguish more individual colours and more Prägnanz steps are created. This is expressed with the Prägnanz step density (D), which grows higher with experience. Note that Prägnanz step density is not used to describe a phenomenon, but is used to describe an individual. But in the relationship between the Prägnanz and non-Prägnanz it is important to develop beyond the concept of the non-Prägnanz being a negation of the Prägnanz. The Prägnanz steps are part of a series of variances that attributed characteristics to both Prägnant and non-Prägnanz complexes. An ambivalent complex either encloses characteristics of a series of other Prägnanzen or encloses absolutely nothing which is also a state.

Prägnanz can be represented as a mathematical function with the Prägnanz steps as separate parts in the function. In this formula there are a lot of independent variables which lie close together and a limited group of dependent variables. The reduction of the depended variables can be explained by looking at the modality. The modality is purely visual and follows certain preferences. An example can be given with an corner. The independent variables are the degree of the corner that can be between 0 and 190 degrees. Or in other words: between 0 and 90 or 90 and 180 degrees. The dependent variable in the formula is the quality of the phenomenological corner. Prägnanz can be described closer by using Prägnanz aspects. These aspects are complex because there are different ways of describing them which are not equally good. These descriptions have been grouped into three aspects. In these groups they are more similar to their in-group than to the two out-groups but they are not similar enough to provide overarching titles for the groups.

The first aspect used to describe Prägnanz is regularity. Regularity provides a description of how clear a Gestalt is. Or in other words: the clearer a complex quality gets, the more it is a Gestalt quality. And the more it is a Gestalt quality the more the complex is a Gestalt. Regularity is graded on a continuum ranging from regular to apparently coincidental.

The symbol (p1) is used to indicate regularity, referring to the first aspect of Prägnanz. Its counterpart (q1) is used to indicate an apparently coincidental Prägnanz. The aspects to follow are based on regularity. The second aspect used to describe Prägnanz is individuality. This is a dichotomous aspect as a Prägnanz is either individual (p2) or derived from other Prägnanzen (q2). The relationship between individuality and derived is asymmetric as a Gestalt cannot be both at the same time. An example can be found in colours. A basic colour such as red is an individual Prägnanz, mixed colours are derived from the individual colours. This example also shows that Gestalt aspects can be found in materials and that regularity is a requirement for individuality. As regularity is a requirement for a complex to be considered a Gestalt a complex needs to qualify as regular before one can determine wether it is an individual or a derived Gestalt. In other words: Every imaginable blend of colours is a regular complex and thereby a Gestalt, but only a few are individual Gestalts. The third aspect used to describe Prägnanz is integrity. This dichotomous aspect indicates if a Prägnanz is intact or disrupted. The relationship between integrity (p3) and disrupted (q3) is asymmetric. A Prägnanz can be disrupted in different ways. Parts can be missing, undesired parts can be added or there can be parts that are not in place. Following the same logic as in individuality regularity is a requirement for integrity. Examples of possible combinations are shown in Figure 7, in which “Beispiel” is German for Example.

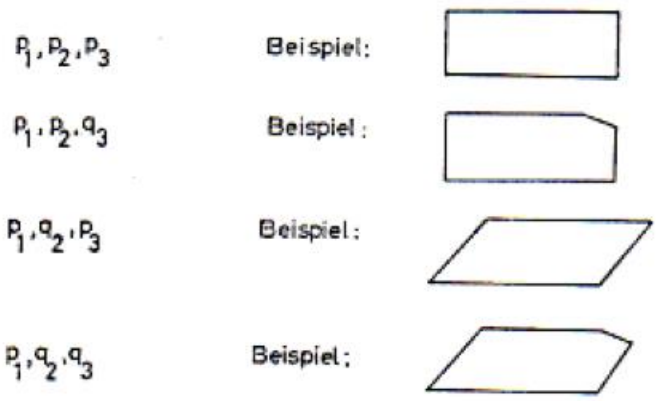

Figure 7.

Examples of Prägnanz aspect disruptions

A comparison can be made between the three Prägnanz aspects and Prägnanz steps. This is done with the example of an corner. Both a sharp, blunt and straight corner are Prägnanz steps. Looking at Prägnanz aspects it becomes clear that there is a hierarchy in how good a Prägnanz is in which the straight corner is at the top. Both the sharp and the blunt corner are experienced related to a straight corner. All of the corners have (p1) and are thus considered Prägnanz steps, but only the straight corner additionally is individual (p2) and integrated (p3).

Prägnanz strength (S) is a number between zero and three that indicates how many of the three Prägnanz aspects (p1, p2 and p3) are present. In contrast to step density it is used to describe a phenomenon. Examples are a straight corner (S = 3) and an almost straight corner (S = 2). Additionally the sovereignty index (J) describes the amount of properties that create the individuality (p2) in a phenomenon. Or in other words: in how many properties individuality is expressed in a phenomenon. Much like the Prägnanz strength the sovereignty is indicated with a number from zero to three. For example a significant Prägnanz like a square has the maximum of 3 points for strength and sovereignty.

There is a fourth Prägnanz aspect: simplicity (p4). Simplicity indicates if a figure has a simple or a complex structure. Though similar this fourth aspect is different from regularity. Simplicity can be expressed dichotomous or on a scale. It reflects one of the main ideas Gestalt psychology is founded on: The tendency for structures towards simplicity. Complexity describes the amount of elements in a complex, a high complexity indicates that a complex has a lot of elements. If there is a phenomenon with a high complexity which the observer is familiar with it becomes of higher value than another phenomenon with a lower, equal or higher level of complexity but with a lower level of organization, or familiarity. These combinations can be summarized in a table as shown in Table 5.

Table 5

Possible combinations of four Prägnanz aspects

p1	p2	p3	p4	p1	p2	p3	q4
p1	p2	q3	p4	p1	p2	q3	q4
p1	q2	p3	p4	p1	q2	p3	q4
p1	q2	q3	p4	p1	q2	q3	q4

This makes the complexity the fifth Prägnanz aspect (p5). As complexity covers the entire variety of regularity is the only Prägnanz aspect for which regularity is not a requirement. Gestalts have a tendency towards a high complexity. This is because simplicity in the Gestalt can only be achieved with a high complexity in the elements. The tendency Gestalts have towards simplicity contains a tendency towards a high complexity. The sixth Prägnanz aspect is character (p6). Character describes how full or rich a Gestalt is on a continuum to its opposite empty or poor (q6). If you meet an old friend you have not seen for a while the experience is a mixture of the expression the friend has at the moment you meet him and things you associate with this person.

This also applies to music, images and other sensations. This illustrates the seventh Prägnanz aspect: meaning (p7) versus meaningless (q7). The meaning is not part of the Gestalt but is added somewhere else.

When describing the relationships and coherences between the Prägnanz aspects in general it can be said that whereas the Prägnanz aspects (p1) to (p5) describe figures, (p6) and (p7) describe the content. Also (p1) until (p4) are centred on regularity, and (p5) until (p7) describe richness. These clusters illustrate the dualism of form and content of a Gestalt. There is a relationship between Prägnanz and reality that is best described by complexity. In its extremes complexity illustrates the earlier mentioned contrast between something and

nothing, and fullness in contrast to emptiness. In general it can be said that due to its importance regularity is the most dominant Prägnanz aspect. Regularity is also closely related to meaning. As it aims at addressing the form rather than the content of the Gestalt meaning is the aspect most suited to express regularity.

The p and q distinctions can also used to describe the situation of a Gestalt. This is done using the orientation and the place of the Gestalt summarized in the Main Room Direction concept. A distinction is made between horizontal (H) and vertical (V) derivatives. But the same objective orientation can appear horizontal in one situation and vertical in another. Additionally a third (M) orientation is used to describe phenomenal dividing orientations. These symbols are added to the previously introduced notation (p2h, p2v, etc.). The three Prägnanz aspects of a form and the location are in interaction with each other. They can express themselves in correlation or in contradiction: they strengthen or weaken each other. It is possible to have a relatively good form in a relatively bad location or a relatively bad form in a relatively good location.

8 **Conclusions**

In a short closing paragraph Rausch addresses the accusation that Gestalt theory has been accused of neglected areas, whereas they have been purposefully postponed to solve the easier questions first. Additionally a lot of the criticisms against Gestalt psychology have been resolved as misunderstandings due to the often difficult and abstract contents.

4 **Analysis**

Reading and studying the works of Rausch gives rise to a whole number of questions. Where does Rausch fit in the outlined Gestalt theoretical history, what is his position in the debates between the two Gestalt traditions, how do the Gestalt theoretical ideas offered by Rausch fit in our modern knowledge of (Gestalt) psychology and does his work provide answers to unresolved questions on Part-Whole relationships? To thoroughly study his work and approach an answer to these questions the translated works of Rausch are studied from a historical and modern psychological perspective.

Rausch in Gestalt History

In the history of Gestalt theory two Gestalt theoretical traditions emerged out of the Gestalt theoretical foundations laid out by the predecessors: the Graz tradition (von Ehrenfels, Meinong and Benussi) and the Berlin tradition (Stumpf, Husserl, Wertheimer, Koffka, Köhler). These two traditions have different approaches to a number of essential topics within Gestalt psychology. The differences between the two Gestalt traditions and their respective positions in the Gestalt theoretical debate are outlined. The information used in describing the two traditions was found in the book *Foundations of Gestalt Theory* by B.Smith (1988). The translated works of Rausch were searched for Gestalt theoretical ideas directly or indirectly related to the debate. Using the collected Gestalt theoretical ideas his position in the debate between the two traditions is framed.

Rausch is a representative of the second generation of Gestalt psychologists in Germany. When looking through work left by Gestalt theorists from the second generation it is not uncommon to find theories combining the approaches of the two Gestalt traditions. This also proved to be case for Rausch. The position Rausch takes on a number of topics leave little room for interpretation, but unfortunately others are less clear cut.

After careful consideration a view on his positions was defined and substantiated with information taken only from the translated works available to the reader. It is important to emphasize again at this point that mainly due to time and size restrictions placed on the thesis not all of his works where translated in the context of this thesis. More than anything the reader is encouraged to reflect on the views offered in this thesis and form their own opinion.

Generally speaking the two traditions have a different approach in solving Gestalt theoretical questions. Whereas the Berlin tradition is focused on the organization and appearance of already existing constructs, the Graz tradition is mainly interested in the way constructs are formed. It is through this approach that psychologists from the Graz tradition identified our experiences of a Gestalt as a product of cognitive processing. They gave birth to what has been called the "Production theory" of Gestalt perception, referring to the fact that a Gestalt is the product of our mind. As these two approaches are complementary more than a matter of being right or wrong, the question is which approach Rausch uses in his work.

In the work left by Rausch fragments can be found using both approaches. There are segments in which Rausch describes the organization and appearance of already existing constructs, and there are segments in which Rausch describes the way constructs are formed. Based on this one could represent the opinion that Rausch combines a constructivist and an objectivist approach in his work. However, none of the researchers in Gestalt theory are known to exclusively use a constructivist or exclusively use an objectivist approach. The question one needs to ask instead is: which approach is predominantly used? A second look through his work reveals that the focus in his work is predominantly on describing the organization and appearance of already existing constructs. A vast amount of examples can be found of this, whereas only sporadic examples can be found of segments defining the way constructs are formed. Additionally these sporadic segments are very brief and only appear in the context of a topic explaining the organization and appearance of an already existing construct.

A good example of a segment describing the formation of a Gestalt can be found in his works *Single-Objectivity as a Phenomenological Property* and *The Property Problem in the Gestalt Theory of Perception* where Rausch defines the concept of isolation. He describes how a complex is formed when elements combine, and a complex disappears when the elements are isolated. The concept of isolation is defined as the separation of individual parts. The four characteristics that describe isolation in a complex are the number of individuals that the elements of a complex are spread over, the time between the parts, the used modality and spatial distance. He writes that in this concept the possibility has to be ignored that an isolated element could combine with other elements and form a new element, complex or Gestalt quality. This is not a small possibility to ignore considering that in the same text in a different chapter Rausch writes that every element we see is part of a Gestalt, even if it is not immediately visible to us. In other words: Rausch acknowledges that every act of isolation implies an act of formation. Both the process of formation and isolation are not necessarily visible to us. However Rausch does not offer an explanation on how this formation takes place and he chooses to ignore it.

In all the translated works a vast amount of segments can be found describing the organization and appearance of already existing constructs. An interesting example can be found in *The Property Problem in the Gestalt Theory of Perception* in which he describes exceptional properties. In this work Rausch describes the exceptional property of hierarchy and weight distribution of the elements in a phenomenal construct. He does so using the relationship between variability and the consistency. Rausch describes how in figures the dominant dimension is decided by the length of the dimensions and the global orientation of the figure. These two factors directly and indirectly influence the perception of the figure. He regards this as a strong influence as he writes in another chapter of the same work how there are two reasons why the shape of a figure is more important in determining the Gestalt than the material the figure is made of. First a shape can be expressed without material, but material always has a shape.

Secondly changing the shape has a stronger implication for the perception of the figure than changing the material it is made of. Interestingly though during the experiments done in the context of his work *Regarding Phenomenological Figure-Optical Dynamics* Rausch describes how in both trials participants indicate that the surface change is essential, emphasizing the quasi-material experience of the figures. This indicates that the figures in both experiments were experienced as quasi-material structures.

Rausch describes how in figures the dominant dimension is decided by the length of the dimensions and the global orientation of the figure. As the same two factors were found to influence the judgement of similarity these two factors are combined to one factor referred to as the descriptive constant dimension. Generally it can be said that the changing variable is the point of interest and the similarity in the descriptive constant dimension is what determines our impression of similarity.

In his work *The Property Problem in the Gestalt Theory of Perception* Rausch emphasizes the role of the observer despite his predominantly objectivist approach. At first this might appear as a contradiction. He makes a distinction between the observer and the environment surrounding the observer. He describes how observations can be seen as being derived from properties, but that properties can equally well be seen as being derived from observations. Properties can be attributed to the observer and the surrounding environment in the same way it is done to figures. The focus can be leaning more towards the observer or the focus can be leaning more towards environment. This depends on the observer. A distinction is made between an active observer embracing the figure and a passive observer simply experiencing it.

However instead of going against his predominantly objectivist approach he appears to confirm it as he goes on to say that a reductionist view in which there are two parts to the observer makes it possible for the body of the observer to be part of the environment and at the same time be distinguished from it. The first is the body, which is part of the environment with objective-phenomenal properties, the second is the central point located in a straight line between the eyes.

Mereology is a subdomain of Gestalt Theory. It involves studying the relations between parts and wholes. In mereology there are two main approaches in the analysis of part-whole relationships: the Berlin and Graz tradition. Their respective objectivist and constructivist approach underlie their different approaches in analysing Part-Whole relationships. In the predominantly objectivist Berlin Gestalt tradition the main idea is that the whole is different (not only greater) than the sum of the parts. Additionally the whole can influence the parts as the parts can influence the whole. In the predominantly constructivist Graz tradition it is believed that the whole is influenced by the parts, but the parts are not influenced by the whole. This is considered the biggest difference between the two Gestalt traditions.

In his work *The Property Problem in the Gestalt Theory of Perception* there is a section describing how according to Rausch one of the biggest achievements in Gestalt theory was the transition from studying Gestalt-qualities to newer Gestalt theoretical ideas of whole and part properties. In this text Rausch describes an interaction in which the parts influence the whole. In other words: the content of the chapters in a story influence the story. Additionally, and more importantly, in the same text Rausch also describes how the whole influences the parts. In other words: the story can influence how the content of its chapters are perceived.

Good examples of this can be found in his work *The Property Problem in the Gestalt Theory of Perception* where Rausch distinguishes three groups of properties that illustrate the influence of the whole on the parts in optical Gestalts: absolute or relative properties, whole properties and system-dependent part properties. Especially the concept of system dependency offers a convincing example of the influence the whole can have on the parts. An example of system dependency offered by Rausch is the orientation of left and right and front and back. These are part properties but are given to the parts by, and influenced by, the spatial orientation system of the whole.

Rausch wrote a meaningful segment on this topic in *Single-Objectivity as a Phenomenological Property* in which he analyses the statement of von Ehrenfels, that "The sum is more than the parts". He starts by describing that Single object properties emerge as the result of the isolation process. Single object properties are complementary to whole properties in this regard as single object properties are created when whole properties disappear, and disappear when whole properties are created. Single object properties can appear in different ways. They can appear independent and calm, incomplete and looking for completion or lonely and by itself or it does not fit in its surroundings. He describes this concept of gaining and losing existence by the term existence dependency. As a counterpart to the existence dependent properties there are existence independent properties that neither lose in the process of isolation of their carrier nor have them before the unification of their carrier. Note that this does not mean they do not change through the processes of unification and isolation. According to Rausch in conclusion "The sum is more than the parts" is to be replaced with "The sum is different than the parts" because von Ehrenfels wrongfully assumed that Gestalt qualities and part-properties are the only properties existing in relationship to isolation. Also here indirect evidence can be found of his conviction that every element we see is part of a Gestalt, even if it is not immediately visible to us.

Summarizing the segments it can be said that, in the Gestalt theoretical ideas offered by Rausch, the whole is defined as being greater and different than the sum of the parts. Additionally the whole is described to influence the parts. In the debate between the Berlin and Graz tradition this approach places Rausch in the predominantly objectivist Berlin tradition of thought on this topic.

Another current debate between the traditions is the question around the nature of a Gestalt. Both the Berlin and the Graz tradition describe complex structures in terms of qualities. However, a significant difference between the Berlin and the Graz tradition is that in the Berlin tradition it is assumed that a psychological formation *is* a Gestalt, whereas in the Graz tradition it is said that a psychological formation *has* a Gestalt much like it has qualities. In other words, in Graz Gestalt tradition a Gestalt is seen as a quality, whereas it is seen as a whole with its own ontological status in the Berlin tradition.

On this topic Rausch writes in *The Property Problem in the Gestalt Theory of Perception* that a second significant progress has been made in fully acknowledging a Gestalt as an attribute: a whole property that is complemented by part properties. In terms of the debate between the Berlin and Graz tradition this definition places Rausch in the Graz line of thought. Additionally, also in *The Property Problem in the Gestalt Theory of Perception,* Rausch describes a dualism in a Gestalt. According to Rausch this dualism can be found in the form and the content of the Gestalt. He illustrated this with the seven factors he identified to describe Prägnanz. He divides these seven factors into two clusters. According to Rausch it can be said that whereas the Prägnanz aspects (p1) to (p5) describe the form of a Gestalt, Prägnanz aspects (p6) and (p7) describe the content of a Gestalt. These two clusters illustrate the dualism of a Gestalt.

The final ongoing Gestalt theoretical debate between the Gestalt traditions is the question around the origin of a Gestalt. This nature-nurture debate is a theme found in many other areas of study. In psychology the nature-nurture debate is a discussion on the origin of the properties of an individual. In this debate nature refers to properties being inherent, and nurture refers to properties being learned by the environment. In Gestalt psychology this question translates to whether the Gestalt laws are inherent or learned. This Gestalt theoretical question has given rise to different opinions. Whereas the older Gestalt theories emphasize the intrinsic nature of the Gestalt laws newer ideas suggest that nurture plays an equally important role in the formation and reinforcement of the Gestalt laws.

Good examples of how the formation of a Gestalt is influenced by nurture according to Rausch can be found in *Regarding Phenomenological Figure-Optical Dynamics* and *The Property Problem in the Gestalt Theory of Perception.* A Gestalt will only be as good or clear as the prevailing circumstances allow. This concept is referred to as Prägnanz. Rausch describes Prägnanz in levels of Prägnanz, expressed with the Prägnanz step density. This is used to describe an individual and grows higher with experience. As Rausch describes Prägnanz is a defining element in the formation of a Gestalt. A Gestalt contains certain properties that distinguish it from other complexes that do not possess these properties. Or in other words: Prägnanz is relative because the regularity seen in the carrier exists in comparison to the carriers surrounding it with less regularity. This mechanism is comparable to natural selection: a competition of regularity and the complex with the highest Prägnanz wins to go on and shape the Gestalt. As individual life experiences influence the Prägnanz step density, they influence the formation of a Gestalt. Through this mechanism nurture has an influence on the formation of a Gestalt.

A second example of this influence can be found the concepts complexity and Gestalt height found in *The Property Problem in the Gestalt Theory of Perception.* Complexity describes the amount of elements in a complex. If a complex has a high complexity it indicates that the complex has a lot of elements.

If there is a phenomenon with a high complexity, which the observer is familiar with, it becomes of higher value than another phenomenon with a lower, equal or higher level of complexity but with a lower level of familiarity, or organisation. This is expressed in the concept of Gestalt height. Gestalt height is fundamental in the formation of a Gestalt and is even described by Rausch as the fundament of what we experience as aesthetics in music, art and poems. Its importance to Rausch can also be derived when he writes that ironically simplicity in a Gestalt can only be achieved with a high complexity in the elements. As Rausch describes familiarity as having an influence on the Gestalt height, which in turn has a profound influence on the formation of a Gestalt. Hence it can be assumed that according to Rausch nurture influences the formation of a Gestalt through this mechanism.

A third and final example can be found in the description given by Rausch of the seventh Prägnanz aspect used to describe Prägnanz: meaning. In *The Property Problem in the Gestalt Theory of Perception* Rausch describes the experience of music, images and other sensations as a combination of the stimulus experienced at the moment and things the observer associate with the experienced stimulus. In his work Rausch does not elaborate on how these associations are formed. However, given his other writings on the increasing of Prägnanz step density through expertise, the increasing of Gestalt height through familiarity it seems reasonable to assume this too is accumulated through learning and life experiences (Nurture). Especially, as it is emphasized by Rausch, this Prägnanz aspect is not part of the Gestalt, but instead is added to it by the observer. Despite his predomination objectivist approach this last remark added by Rausch can be understood in the context of the production theory predominantly found in the Graz Gestalt tradition.

The influence of nature on the formation of Gestalt laws, although present in his work, can only be deduced. In all of the segments founding the work of Rausch describing the influence of nature on the formation of Gestalt laws a pattern is visible. They all describe the “refinement” of already existing Gestalt laws. Or in other words, the fragments never describe the formation of Gestalt laws.

This suggests there existence is assumed by nature. Many Gestalt representatives of the second generation agree that both nature and nurture influence the process. As many of the Gestalt representatives of the second generation throughout his work Rausch describes a Gestalt finding its origin both in nature and in nurture. Nowadays the question is rephrased as: How is nature nurtured?

Rausch a hierarchical visual system

A challenge modern Gestalt researchers face is that some of the Gestalt theoretical ideas appear to be in conflict with current discoveries in psychology. One of the most significant is in the context of the visual system. Throughout the history of psychology different models have been developed to explain the way our visual system works. One of them is the model of a hierarchical feedforward processing stream in the visual cortex from elements (features, parts) to objects (configurations, wholes). This currently popular notion was first described by Hubel and Wiesel (1962, 1965). It describes how the visual system functions as a hierarchy in which a large number of sensory elements enter at the bottom, which are then combined to form exponentially bigger elements as they travel “up the pyramid”. The top of the pyramid can be understood as the Gestalt.

Applying this model to Gestalt theory a distinction has to be made between the Berlin and the Graz Gestalt tradition. A hierarchical feedforward processing model seems to be in conflict with the ideas described by the Berlin Gestalt tradition. The essential idea of the Berlin tradition in this is that the whole can influence the parts. The Berlin tradition describes a two way interaction. It can be understood in terms of feedforward and feedback pathways. For the whole to be able to influence the parts, the Berlin tradition relies on a feedback pathway that relays information back to the element after the Gestalt was identified through the feed forward pathway.

A pure hierarchical (one directional) feedforward model of the visual system would not allow for this feedback pathway. This would make any influence of the whole on the parts theoretically impossible. It is because of this that an entirely hierarchical feedforward model of the visual system does not conflict with the characteristic ideas of the Graz tradition. Because in their vision the whole does not influence the parts there is no need for a feedback pathway.

From what we have been able to learn from the translated works, Rausch shares the approach of the Berlin tradition on the topic of part-whole relationships. In his work describes how the whole influences the parts. Additionally in his work Rausch describes in a number mechanism through which nurture influences the formation of a Gestalt. As both require a feedback pathway to influence the Gestalt, these notions indeed seem to be in conflict with an entirely hierarchical feedforward model of the visual system.

In the following years a number of discoveries were made in the anatomy of the visual system. Among the discoveries were highly reciprocal connectivity and parallel channels (Rockland and Pandya, 1979; Stone et al., 1979; Lennie, 1980), a considerable segregation of information flow throughout the visual pathway, a substantial intermixing and cross talk between streams at successive stages of processing and the multiplicity of connections per area and the near ubiquity of reciprocal connections. (Felleman and Van Essen, 1991). In the light of these discoveries an entirely hierarchical feedforward model of the visual system seems highly unlikely.

The other side of the story is that it would seem equally unlikely that the visual system works like a network without organized processing levels. Research demonstrates that this is indeed not the case.

A number of studies that followed indicated that some visual areas of the brain which are strongly associated with the “Bottom of the pyramid” such as those in the temporal and parietal lobes are also involved in higher levels of information processing than areas of the brain which are strongly associated with the “Top of the pyramid” such as V1 and V2. (Ungerleider and Mishkin, 1982). Additionally, much like described in a hierarchical model, studies show that a low-level representation of the incoming stimulus is the starting point from which higher-order shape representations are computed gradually (Riesenhuber and Poggio, 2000).

Even just speaking from a theoretical perspective, just because a purely hierarchical organization of the visual system seems highly unlikely does not mean the concept of a hierarchical processing visual system needs to be abandoned all together. Instead, a solution appears to have been found in the grey area between the two rigid models of a strictly serial scheme and an unorganized network.

Models of the visual system were designed describing a hierarchical visual system that has feed forward and feedback pathways. One of these possibilities is that cortical areas are hierarchically organized in some very well-defined sense, with each area occupying a specific position in relationship to all other areas, but with more than one area allowed to occupy a given hierarchical level (Felleman and Van Essen, 1991). Another possibility is that a hierarchy exists only in a loose sense, for instance, at the level of the different cerebral lobes, but not in any precisely definable manner for individual cortical areas (Riesenhuber and Poggio, 2000). These new models do not appear to be in conflict with the ideas of the Berlin tradition as it allows for a feedback pathway. An example of a model developed with this concept is the hierarchical model of Riesenhuber and Poggio. A number of studies confirm this general hierarchical scheme (Kobatake and Tanaka, 1994; Riesenhuber and Poggio, 1999; Pasupathy and Connor, 2001).

Conclusions

Rausch is a representative of the second generation of Gestalt psychologists in Germany. As described, it is not uncommon to find theories combining the approaches of the two Gestalt traditions when looking through work left by Gestalt theorists from the second generation. Summarizing the analysis made in this chapter this also seems to be case for the work of Rausch, as thoughts of both Gestalt traditions can be found in his work.

There are segments in which Rausch describes the way constructs are formed and there are segments in which Rausch describes the organization and appearance of already existing constructs, however in his work the focus is predominantly on the latter. This suggests that Rausch shares the predominantly objectivist approach of the Berlin tradition. This objectivist approach underlies his approach in analysing Part-Whole relationships. Rausch shares the vieuws of the Berlin tradition that the parts influence the whole, the whole influences the parts and that the whole is different than the sum of the parts. These ideas would suggest a strong influence by the Berlin Gestalt tradition.

On the other hand, influened by the Graz tradition, Rausch vieuws a Gestalt as an attribute: a whole property that is complemented by part properties. Aditionally, much like many representatives of the second generation, Rausch shares the idea that nurture plays an important role in the formation and reinforcement of the Gestalt laws. In his work a number of examples can be found describing the influence of nurture on the formation of a Gestalt.The influence of nature on the formation of Gestalt laws, although present in his work, can only be deduced.

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