The Mute Iconic Criticism of Design

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This essay explores the question of how critical thought about images can be compared with the different processes of decision and judgment that take place in the designing of images, specifically through the technique of drawing. On the basis of theoretical models taken from cognitive science, this essay attempts two verbal descriptions of the drawing process. These illustrate that the decisions essential to the genesis of a drawing can only be described inadequately in language. Three systematic drawing experiments concerned with the genesis of images make visible specific processes that take place beneath the threshold of consciousness. In this way, a preliminary non-verbal differentiation between images becomes visible, which gives rise to subsequent practical experiments.

[1]
Fritz Mauthner, Wörterbuch der Philosophie (Leipzig 1923), vol. 2, p. 257.

[2]
Ralf Konersmann «Die Augen der Philosophen: Zur historischen Semantik und Kritik des Sehens,» in Kritik…

[3]
David Bohm, On Creativity (New York 2007), 154–155.

[4]
Gui Bonsiepe, «The Uneasy Relationship between Design and Design Research,» in Design Research…

In accordance with its etymological root, the Greek κρίνειν (to part, divide, or separate, but also to sight (sichten)), [1] critical thinking is described as thinking with the objective of *differentiation*. [2] From this approach, criticism can be defined as the basis for *deciding*, and also as the basis for *evaluating* an object according to different standards, such as those of practice, logic, technology, or aesthetics. The method of criticism is also widely considered a prerequisite for any in-depth reflection. In this regard, critical thinking is the basis for epistemological philosophy, and can be traced from Socrates' aporetic procedure, to Immanuel Kant's critical writings to the philosophy of science in the twentieth century. Also in the context of research in natural science, a critical approach results in the demand for new explanatory models, and thus becomes the catalyst for developments in knowledge. [3] Although the etymological derivation of the word *criticism* includes the visually-oriented activity of *sight*, the differentiating mode of thinking directed at producing knowledge is exclusively associated with thinking in the abstract symbol systems of language or mathematics. In accordance with the concerns of research in iconic theory, which takes as its objective the development of knowledge about the meaning of images, and which employs criticism as its method in pursuing this objective, in the following, an attempt is made to investigate the visual meaning of κρίνειν, and to present the genesis of images as a process in which iconic constellations are critically inspected.

Based on this approach, it is possible to derive a question of image-science that is not only directed at verbal analysis, but is also oriented toward poietic practice. This question places the comparative activity of critical thinking about images in relation to the processes through which images are produced: thus, it belongs to the fields of inquiry of practice-oriented iconic research and design research. [4] The question is: How can new knowledge about images be gained through

the systematic creation of images, and under what conditions can the design process be employed as a critical procedure?

This comparison is motivated by the observation that in the process of generating images in visual communication, design, and architecture, many different forms of decisions are made that cannot be compared with thinking in the abstract symbol systems of language, but that result in the evaluation of the effects of visual constellations. This aporetic starting point, the formation of an analogy between the design process and critical thinking, in the following is structured as an analysis of image creation processes, the verbalization of which is assisted by theories from cognitive science.

These theories and the related terminology are introduced in order to place the bodily actions and reactions of the design process in relation to thinking in abstract symbol systems, and thereby to achieve an in-depth analysis of the image creation process.

Deciding and Categorizing from the Perspective of Cognitive Science

Cognitive linguistics describes a spectrum of thought processes, which range from unconscious emotional reactions to changes in the environment, to thinking in complex metaphors in abstract symbol systems. Theories of *embodiment* differentiate this continuum of thought with the objective of explaining the relationship between physical constitution and the structures underlying language. From the perspective of cognitive science, the categorization of events in an organism's environment, and thus their differentiation, is a process that is influenced by the physical constellation of the apparatus of perception, and that takes place only partially in the realm of conscious thought. Important categorizations of vertical/horizontal, near/far, above/below, etc. are automatically carried out in the process of perception, so that, for example, there is no need to think about whether an object in our environment is located above or below a certain reference point. [5]

These acts of deciding that remain closed off from conscious thought processes are ascribed by the cognitive sciences to the realm of unconscious perception — the *cognitive unconscious.* [6] In this context, emotions are described as unconscious reactions to ongoing changes in an organism's environment. The recurring qualitative evaluation of these reactions has the effect that they become discernible, enter into consciousness as *feelings*, and finally can be named. [7] Feelings, together with other perceptual stimuli and the patterns for processing them, form *image schemata,* which are defined as complex, multi-

[5]
George Lakoff and Mark Johnson, Methaphors We Live By (Chicago 2003); Philosophy in the Flesh: The Embodied...

[6]
Lakoff and Johnson, Methaphors,10 (note 5); Johnson, The Meaning of the Body: Aesthetics of Human Understanding...

[7]
«Under certain specifiable conditions, we have a qualitative awareness of our sensations and emotional responses...

[8]
«An Image Schema is a dynamic, recurring pattern of organism-environement interactions. As such, it will reveal…

[9]
See ibid., 178.

[10]
See ibid., 31.

[11]
«The body is the vehicle of being in the world, and having a body is, for a living creature, to be intervolved…

sensory impressions of a recurring body/environment interaction. [8]

On the basis of stored image schemata, primary metaphors can be formed in which two body/environment interaction patterns are placed in relation to each other. [9] To illustrate this, the association between physical movement along a path and the concept of temporality can be considered a simple metaphor, upon which more complex metaphors are built. These become manifest in figures of speech such as «the deadline is approaching» or «take things as they come.» [10] The examples demonstrate how bodily experiences form the basis for the concepts of language, and therefore, the possibility to formulate thoughts.

Thus, thinking in abstract symbol systems is understood by cognitive linguistics as directly dependent upon bodily experience, or «being in the world,» in the words of Maurice Merleau-Ponty. [11] The idea of critical thinking as a scientific method that takes place independently of a bodily reference, and therefore without emotionality, or without decisions made beyond the bounds of the conscious mind, is thereby brought into question. The sensory/motor apparatus, decisions on the level of emotion, and thinking in the form of language, prove to be so tightly interwoven that these procedures can scarcely be isolated.

Because these theories of cognitive science analyses have been interpreted through linguistics, the question remains open as to how the forms of thought described above are manifest in the designing of images, and how unconscious categorization and articulated thought relate to each other in this process. The foundations of cognitive science are of central importance because it can be assumed that the production of an image — especially a drawn image — as the trace of a physical movement depends much more directly on physical constitution than can be demonstrated in the structures of language. The analysis of the close relationship in the design process between body, thinking, and materiality (the tools and ground of the trace) offers the possibility of conceiving their interdependence more clearly, and of recognizing the mechanisms of unconscious perception so that they can be intentionally employed.

**Articulable decisions in the design process:
first verbal experiment**

The term *design* is defined here, on one hand, as the process through which new ideas and artifacts are generated; on the other hand, it also refers to the materialized intermediary stages in this process, which take the form of notes or sketches. In the design of an image, through the production of visual variants and their evaluation, a definitive visual form is developed that has never been seen before.

There have been many attempts to represent the process of image creation schematically. The figures employed for this purpose include spiraling timelines, targets, mind maps, or detailed process diagrams [fig. 1 – 6]. In a simplified fashion, the design process can be characterized as a succession of phases of playful experiment (intuitive phase) and rational analysis (analytic phase).
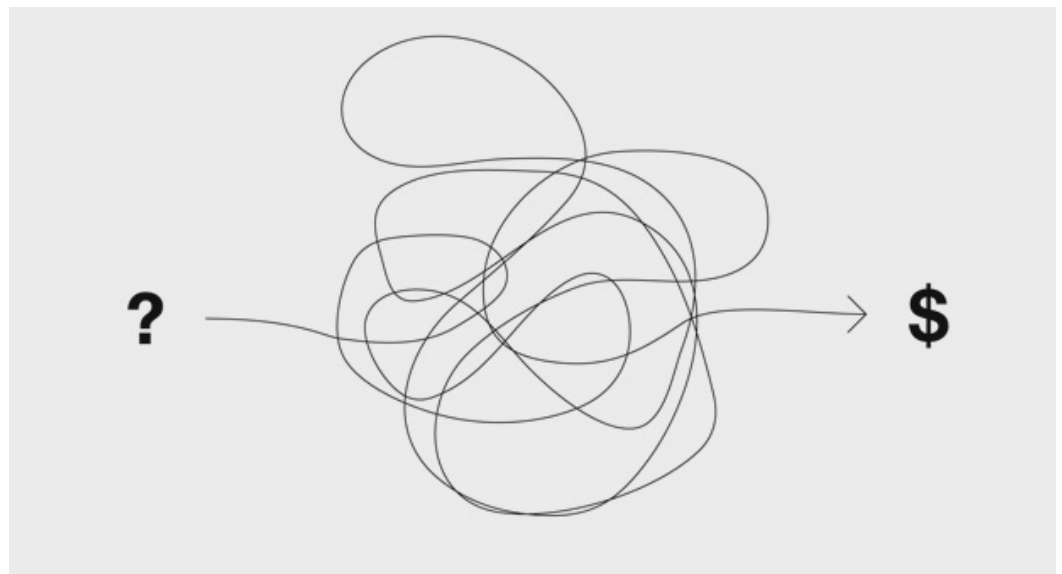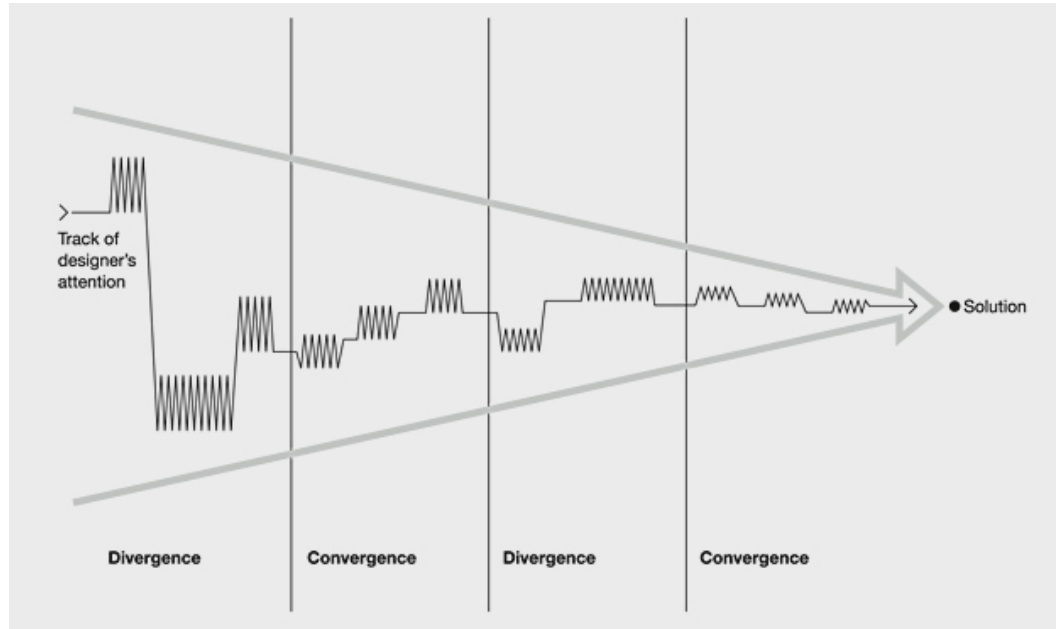

fig.: 1 >
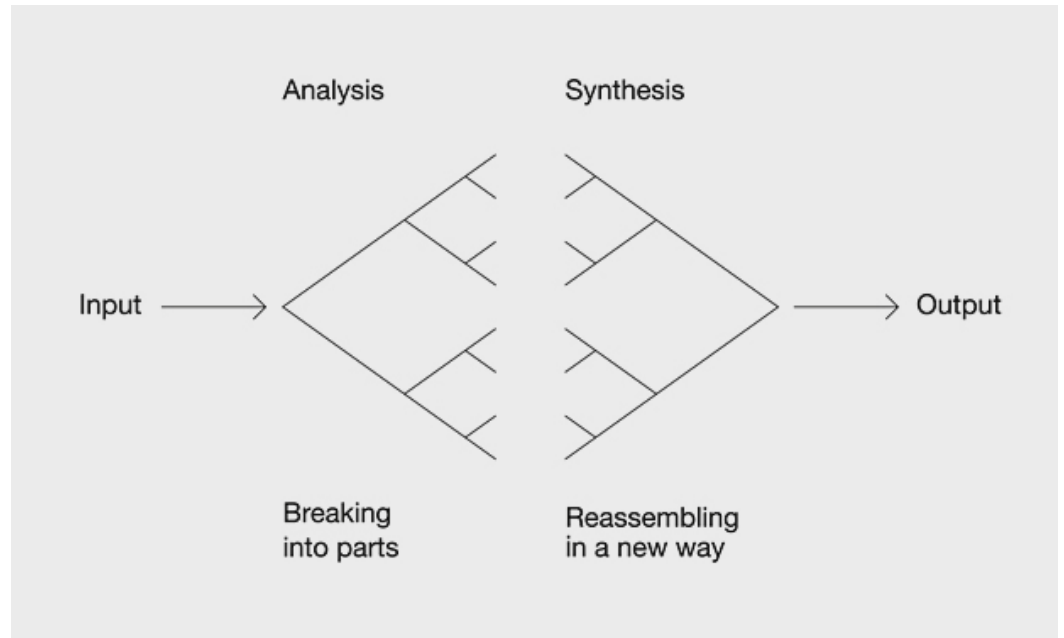
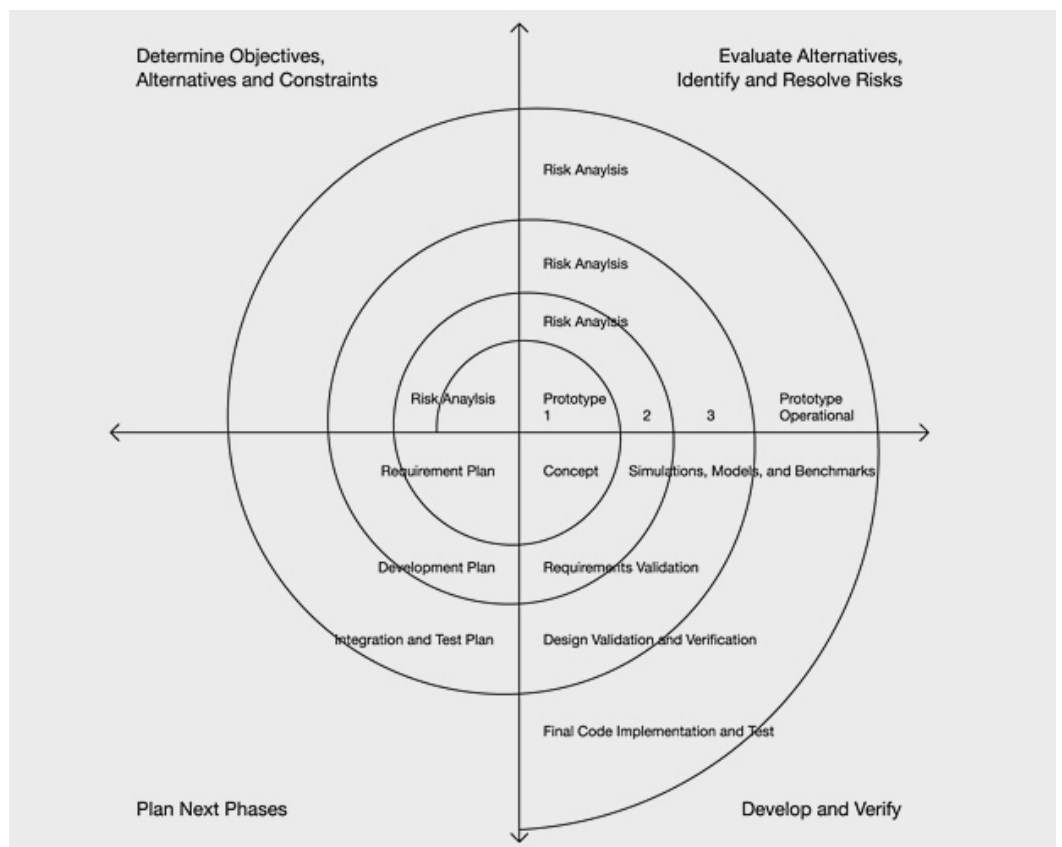fig.: 2 >
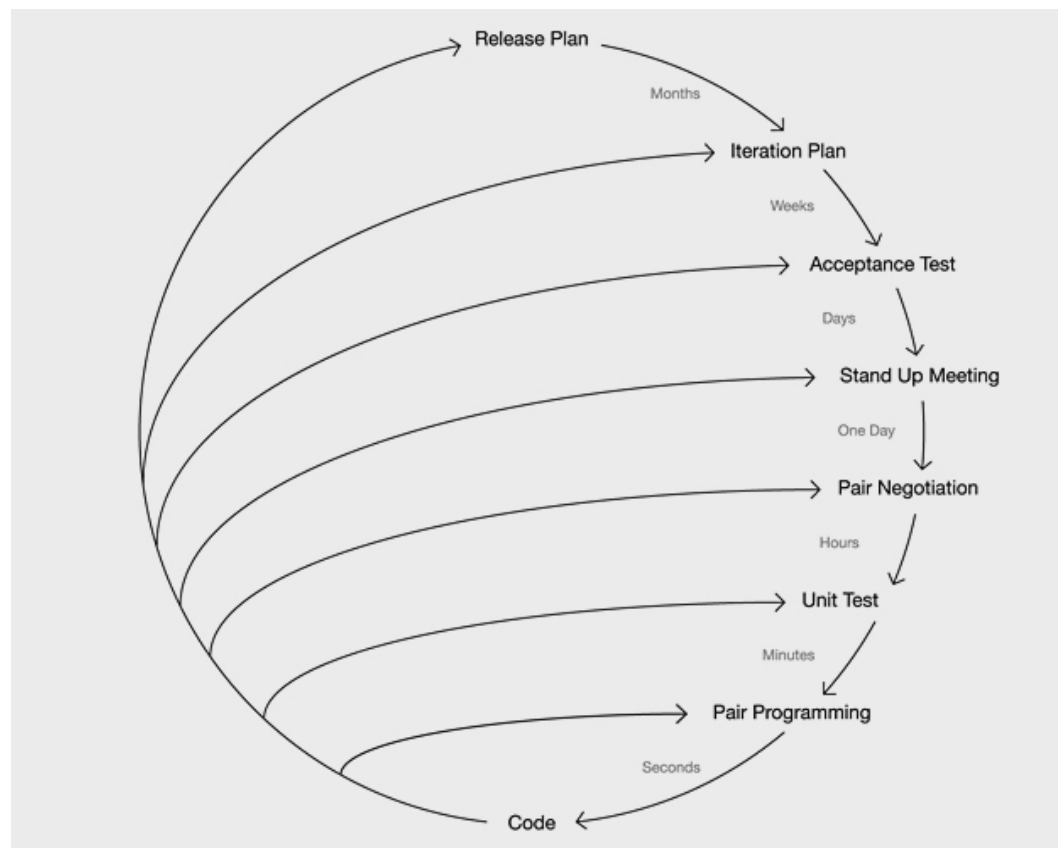
fig.: 3 >

fig.: 4 >

fig.: 5 >

[12]
Srini Narayanan, Sensory-Motor Representations for Metaphoric Reasoning: About Event Descriptions (Berkeley 1997).

[13]
By referring to the «iconic gensture» described by Michael Tomaseelo, I do not intend to equate the gesture of drawing...
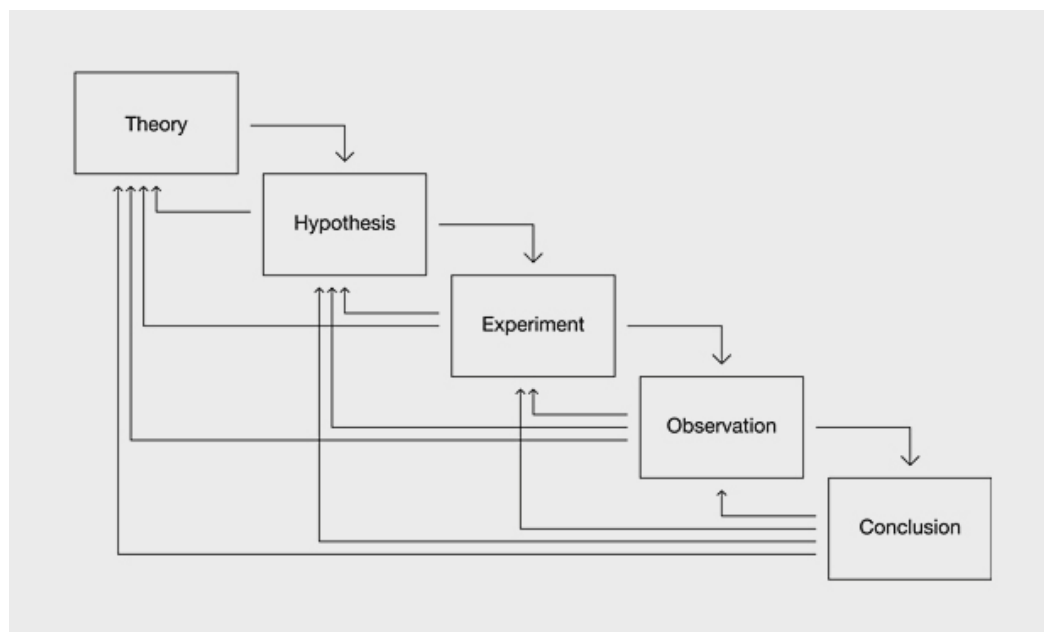
fig.: 6 >

The computer- and neuroscientist Srini Narayanan describes the structure that underlies any motor action as a sequence that can be divided into identifiable phases: [12] the initialization phase, starting phase, phase of main activity, possibility to interrupt, possibility to resume, possibility to vary or continue the main activity, assessment of whether the objective has been achieved, concluding phase, and end phase, are the simplified elements of the motor process model. For the process of designing images, we can experimentally apply this schema in two different ways. On one hand, the model can be applied to the entire process of designing an image, and on the other hand, the model can be applied to the execution of the smallest unit of the design process – the drawing of a single line in a drawing. In order to keep the observation of the relationship between design and critical thinking as simple as possible, in the following, the image creation process will be limited to the example of freehand drawing.

If we begin the linguistic experiment of the analogy between the motor process model and design with the *initialization phase,* then this is the point at which the designer decides to make a drawing that is to serve a particular purpose. If we understand drawing, or the image in general, as a means of communication, then the *iconic gesture* is needed when it is impossible to indicate something in the communication context [13] Drawing from paleoanthropological studies, we can suggest three communication objectives that also pertain to images: the communicating individual may want to prompt his or her partner to perform an action, to

[14]
Ibid., 324f.

[15]
Also see Hans-Jörg
Rheinberger,
Experimentalsysteme und
epistemische Dinge: Eine
Geschichte…

[16]
«Hence, it is not
overambitious to detect in the
poetics of the ‹open› work —
and even less so in the ‹work
in movement›…

inform that partner, or to share feelings with him or her. [14]

This analysis of the motivations for communicative expression has also been made in the context of language development. In the context of design, we can infer that the starting point of the design process is a judgment of existing images. If no images are available that serve the purpose of guiding the actions of other group members, informing them, or sharing an emotional state with them, then there is the need to produce an image that fulfills the desired purpose. A design process is thus initiated when the effects of the images that are known or available do not correspond to the ideas of the designer or the group that is pursuing a visual communication objective. Even this first step is based on the evaluation of the effect of images, and necessarily includes defining the purpose of an image that already exists or has yet to be created. If we look at the design process, we see that in the initialization phase, only a very general statement can be made about what the pictorial result of the process will be. [15] This phase is more concerned with defining basic parameters as criteria for the evaluation of the designs to come, through which a field of possibility can be suggested. With the establishment of these criteria, it becomes possible to evaluate images that cannot be predicted, through comparing the purpose and the achieved effect of a completed design, on one hand, and comparing the individual intermediary designs within a visual field of possibility, on the other. In this way, a multi-dimensional field is generated that, following Umberto Eco, can be termed a «field of possibility.» [16] In order that the design process does not become a technical execution of a familiar image concept (in the manner of craftsmanship), openness to the visual results is a prerequisite for unexpected pictures.

In the second process phase, the *starting phase,* the designer prepares to make a drawing. The approximate size of the drawing is determined, as well as the tools and the paper. These decisions relate directly to the type of drawing movement that will follow in the main activity of the process. If it is a large-format work, then the designer's entire body will be involved in drawing at the easel. The anatomically conditioned possibilities for moving the arm are crucial for the creation of drawn forms, in processes in which the distribution of lines is developed and form is constituted through their concentration, according to the designer's preference. If a smaller format is chosen, the designer will work at a table and employ movements of the wrist. From these smaller movements in space, hatching becomes the preferred basic element from which a form is created. The designer's viewing angle and the light conditions are also selected in the starting phase, and paper, easel, and model are brought into the optimal relative position.
In drawing, the *main activity* consists in the positioning of lines

[17]
In this regard, reference can also be made to disegno. In a discussion of Vasari's second edition of Vasari's...

[18]
Michael Polanyi, The Tacit Dimension, (Garden City 1966).

as traces of movement on the surface of the paper. The sheet of paper is first calibrated with fine groups of lines and, from this rough description, which is adjusted successively with observation of the model, a concrete picture develops gradually. In the main activity, there is also the latent *possibility of interruption.* Continual assessments are made as to whether the endpoint of the drawing process has been reached, or whether the concentration of lines and the advancing concretization still has the potential to improve the drawing in accordance with its purpose. At this point in the process, the drawing can be deemed unsuccessful for various reasons. Perhaps the proportions have not been rendered correctly and the positioning of lines has progressed so far that any attempt at correction through resumption of the main activity seems futile.

After evaluation during a pause, there is the *possibility to vary or continue the main activity.* If the main activity is not abandoned because the designer thinks the drawing can possibly be improved, then the drawing of lines is resumed or else is varied. In an advanced phase of drawing, the designer may decide to use a softer pencil, for example, which enables crucial lines to be made darker. Before the drawing is concluded, the designer *assesses whether the objective has been achieved.* If the designer decides that the drawing meets the goals established in the initialization phase, then the main activity will be reduced.

In the *concluding phase,* distance is assumed from the main activity and its result is evaluated. Perhaps some more interventions are made at certain places in the composition. When the final interventions are completed, in the *end phase* the drawing is fixed in order to protect it from any further, undesired modifications. In observing the drawing from a distance and comparing the drawing to other works, the designer can decide what significance to allot to this particular drawing: if it enhances his or her collection of works, then it may be included in the portfolio; if it fulfills its purpose but is inferior in comparison with other drawings, then it may be discarded.

Thus concluded, this first attempt at describing the drawing process makes clear that in the course of a drawing's production, decisions are carried out at different levels of consciousness. While the initialization phase and parts of the starting phase have a strategic and analytical orientation and therefore employ a conscious and articulable decision process, the decisions made during the development of form, which takes place in the phase of main activity, occur in a space apart from conscious thought. [17] These decision processes, which in the cognitive sciences occupy the realm of emotion, in other contexts are referred to as *tacit* [18] or *implicit knowledge,* or *intuition.*

**Unconscious decisions in the design process:
second verbal experiment**

By applying the motor process model to the smallest unit of the activity
of drawing — the drawing of a single line — the previous experiment
can be expanded. It is the objective to further differentiate decision
processes that contribute to the genesis of images, especially the
interaction of unconscious and conscious evaluation. In the context
of an advanced portrait drawing, for example, the initialization phase
of drawing a single line establishes the objective of the drawing
movement, which objective is deduced by observing the lines that have
already been drawn. For example, the line may serve to add precision
to a particular part of the face that has been laid down roughly. This
line that adds precision should be made to fit with the disposition of
the drawing as a whole, and should not stand out too forcefully in the
context of the lines that have already been drawn. In this attempt at
describing an unconscious level of decision, it already becomes clear
that these criteria can only be drawn from generalized experiences of
drawing, and that they correspond to an idea of drawing that is very
unspecific.

That is to say, these criteria and their verbal description can only
assist to a limited extent in the successful execution of the line being
drawn. In technical drawings, which are produced without the goal
of developing a new form, the objective is defined and the form of the
line is described on the level of conscious thought. In a process in
which a new form is being developed, the decisions must remain on an
unconscious level, and therefore cannot be directly verbalized. In other
words, in the process of free-hand drawing, no line is made through
exclusively analytical reflection on its goal and form.

The starting phase, which can be described as the positioning of
the drawing tool on the paper, only involves a conscious action
in rare cases. In the placement of the first brushstroke of an ink
drawing, it's possible that after many failed attempts, the designer
would concertedly choose not to begin at the center of the paper.
And afterwards as well, the further development of the image can
be described as a reaction to existing elements of the image, which
follows its own logic of movement. The successful continuation of
the ink drawing is not achieved through a conscious controlling of
motor function. Rather, it stands in direct relation to the options for
movement and the internal rhythms of the body. With the drawing
of a single line, the phases of the *main activity*, the *possibility for
interruption and resumption,* the *possibility to vary or continue the
main activity, assessment of whether the objective has been achieved,*

the *concluding phase,* and the *end phase* attest to how difficult it is to describe unconscious decisions verbally. «This means the analysis of the gesture [of painting] shows the analysand that he must put himself into the gesture if he wants to solve its mystery. The understanding of the gesture must be an understanding of the self.» [19]

First drawing experiment towards the differentiation of the cognitive unconscious: the influence of the physical constellation of the arm

Using the figure of an ellipse, we can attempt to come closer to the drawing process. There are various procedures for generating the figure of a flattened circle. We can construct the ellipse geometrically and produce the line from all the points that have the same total distance to two foci. The sequence of these points creates the figure of the flattened circle, which can also be produced in a practical manner with two pins, a string, and a pencil on a piece of paper (this is also called a «gardener's ellipse.») In addition, the ellipse can be thought of and constructed as the projection of a circle onto a slanted plane, or can be generated directly on the computer screen using a drawing program [fig. 7].
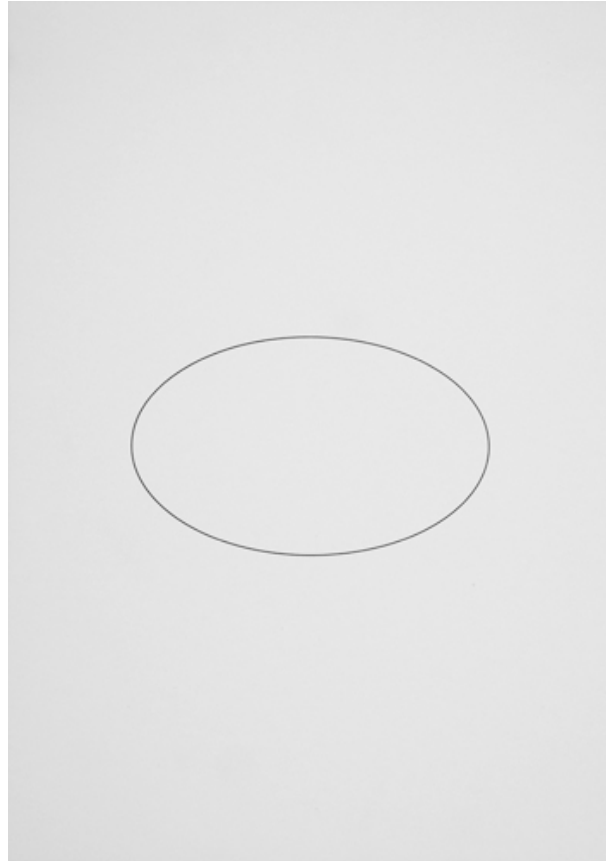
fig.: 7 >

These constructions are not freehand drawings, and unconscious decisions ideally do not arise. The result of the constructed ellipse can be described with words such as *exact, emotionless,* or *technical.*

However, even with the freehand tracing of an existing ellipse, decisions below the threshold of consciousness come into play. The process of tracing the line includes the continual assessment of whether the pencil is deviating from the given line or is following it as exactly as possible. Perception and motor function work together to ensure that all deviations of the pencil from the pattern are continuously corrected. What is produced in this way is not a new image that has never been seen before, but a reproduction of a familiar curve, the presentation of which can be characterized as *technical, tentative, uncertain,* or *shaky* [fig. 8].
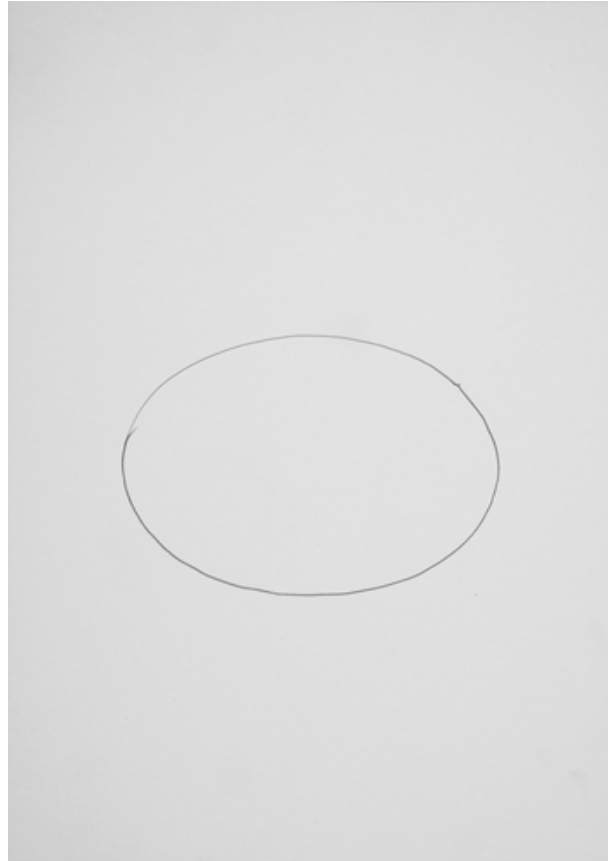
fig.: 8 >

The method of large-format freehand drawing, which is executed in a standing position, is not based on a pre-existing figure that is traced. Rather, in the drawing process, the form is developed with the pencil *out of* the paper, and the options for moving the shoulder, upper and lower arm and hand, result in a preference for certain line trajectories that can be executed easily. Large-scale curve segments and vertically oriented straight lines are easy to develop based on motor function. Curves are formed through the circular movements of the shoulder, the elbow, or the wrist. Straight lines are formed through a hand movement of falling or pushing, the strength of which, against the resistance of the surface of the paper, is concretized in a dynamic line.

In the grouping of many freely drawn lines, a definitive figure emerges through the density of their distribution [fig. 9].
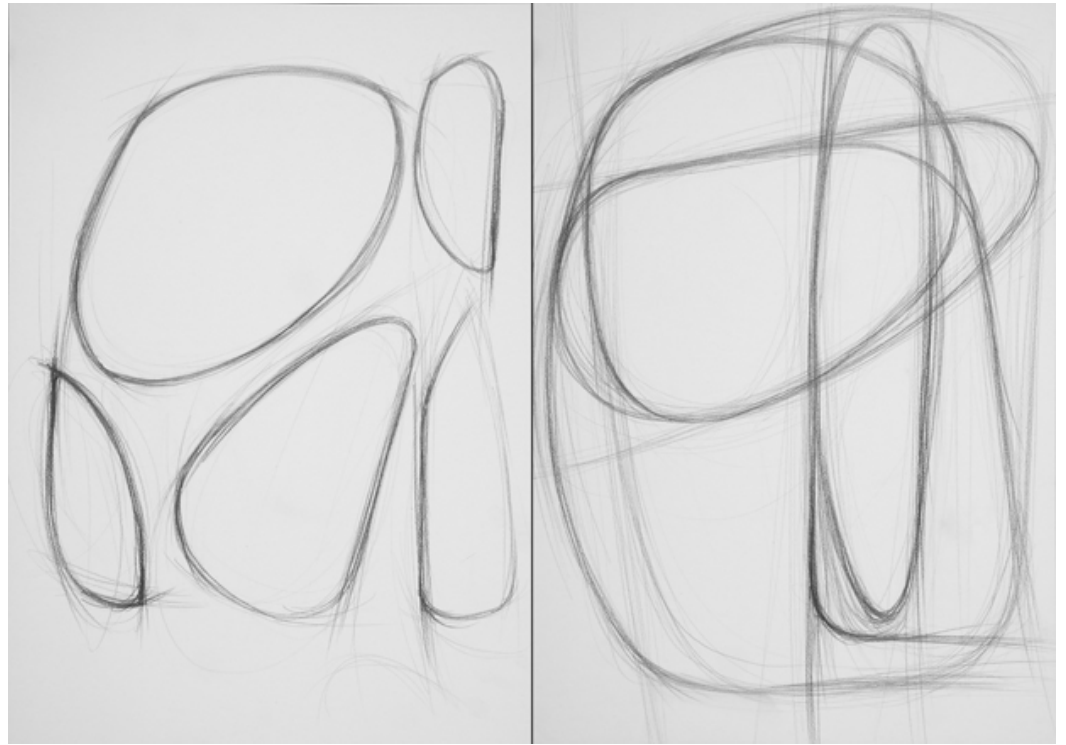
fig.: 9 >

The drawing of a line through trusting the decisions of unconscious perception is the precondition for the emergence of evaluative procedures that become tangible in the realm of conscious thinking. The drawings in figure 2c show the result of processes in which forms are created freely in combination of the designer's preferred movement options. If we engage these preferences in the drawing of an ellipse, then a visual form is produced that, as opposed to the traced ellipse, appears *balanced, harmonious,* and *dynamic* [fig. 10].

fig.: 10 >

In the context of analytical drawing, the ellipse is a basic element whose form can be employed for the testing of observations. A square lying in a horizontal plane has been depicted correctly, in terms of the spatial representation of its angles and the relationships between its sides, if we can inscribe a horizontal ellipse inside it [fig. 11].
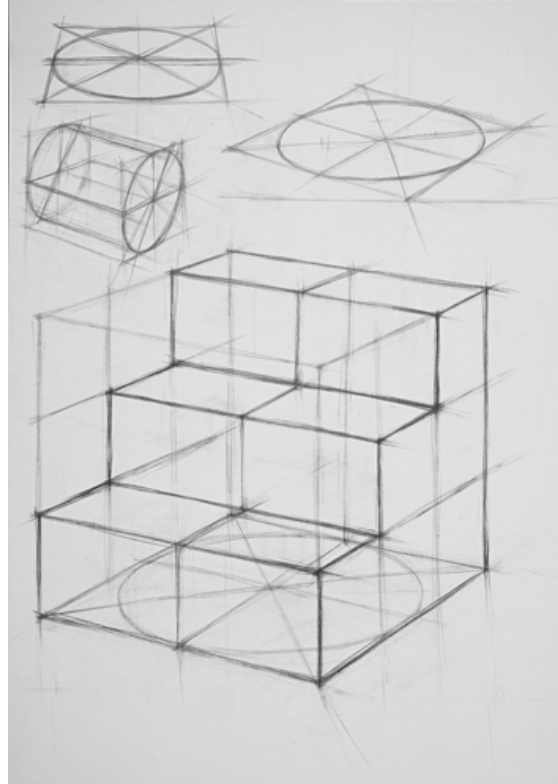
fig.: 11 >

The role of image schemata in the unconscious decision processes of drawing cannot be definitively ascertained in the drawing experiment presented here. As an elementary figure of analytical drawing, the ellipse is a geometric figure that plays an important role in explanatory spatial diagrams. It is probable that this culturally informed significance of the ellipse also affects unconscious evaluations in the process of creating a drawing. In deciding to make an analytical drawing, the designer is consciously subjecting him- or herself to very specific ideas about spatial representation. Through the choice of tool and its use, the designer determines the relationship of the image to the experience of body/environment interaction. In a computer-generated form with its unambiguous precision, the experience of perception is less present than in a freehand drawing, with its ambivalent definition of form using many lines.

From the series of drawn ellipses presented here, it can be inferred how a body movement — a movement of the arm — can be employed in a freehand drawing so as to produce an accumulation of lines that is both precise and dynamic. It is perceived as harmonic or natural because, in its multiplicity of layers, it is analogous to body/environment

interactions we experience. How this method for developing forms compares with the *generative* image creation processes enabled by programming codes must, in the context of this study, remain an open question [fig. 12].
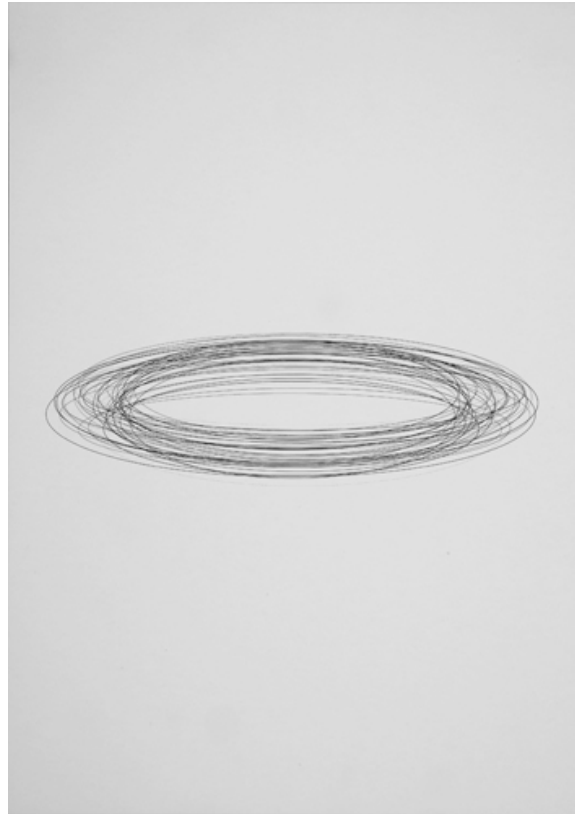
fig.: 12 >

Second drawing experiment toward the differentiation of the cognitive unconscious: the influence of experience

A second example that indicates the qualities of the sensory/motor apparatus and its concealed decisions consists of two series of nature studies produced under varying degrees of time pressure. In the first series, the drawings were produced in the decreasing time intervals of 30 minutes, 10 minutes, one minute, and 10 seconds, with the goal of representing the object as it is perceived [fig. 13].

fig.: 13 >

The series makes clear how the shortening of the time span available for drawing impacts the abstractness of the resulting image. In the shortest time span, decisions must be made under high pressure and reflex-like movements must be employed. In the second series, five drawings are made in different time intervals established in advance, with the goal of representing the object as it is perceived. The first 10-second drawing requires that the designer take fast, basic steps to abstract the form [fig. 14].

fig.: 14 >

The next three drawings were produced in a longer time span and therefore enabled a more profound engagement with the object and its translation into a drawing [fig. 15].

fig.: 15 >

Spatiality, contrast, composition of the area surrounding the object, etc. could be investigated at leisure in these drawings. Again produced in a time span of 10 seconds, the fifth drawing, in comparison with the first, shows distinct differences in the translation of the represented object [fig. 16].
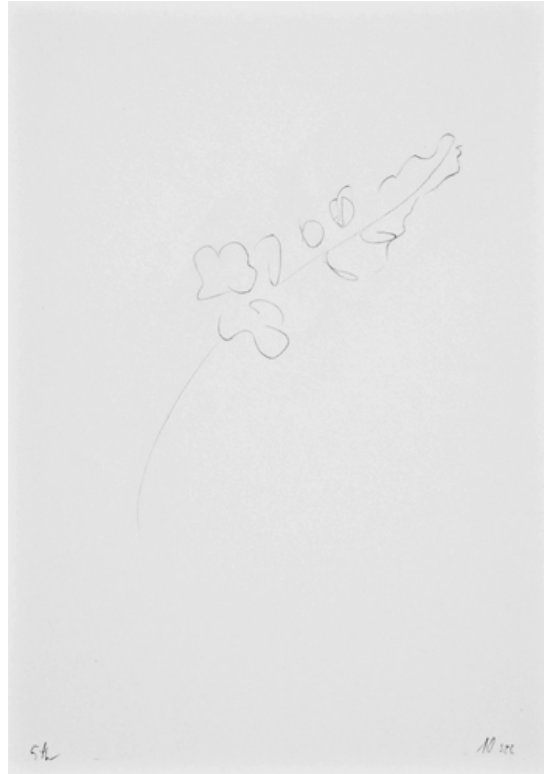
fig.: 16 >

From the unspecific interpretation of the first drawing, which follows the object's silhouette, another drawing is produced that is equally reduced, but that does a better job at characterizing the object. The drawing's exposition of the interior form, with the suggestion of individual blossoms and their rhythmic repetition, is directly derived from the designer's experience with the more detailed drawing.

From this series of drawings, which is taken from a group of similar experiments, it is shown how the translation of an object in a fast drawing process, which necessarily relies on unconscious decisions, depends on the designer's experience with the object. Although the unconscious decisions made in the drawing process can scarcely be verbalized, they can be influenced by drawing exercises and visual study of the object to be depicted. Along with the designer's experience, engagement with the object of representation influences the decisions of unconscious perception.

[20]
Rainer Wick, Bauhaus
Pädagogik (Cologne 1982),
88f.

Third drawing experiment toward the differentiation of the cognitive unconscious: the influence of the constitution of the sensory/motor apparatus

Ambidextrous drawing was utilized by Johannes Itten in the 1930s at his private school in Berlin, as part of the drawing curriculum. The practice was intended to train the left hand and thereby holistically cultivate the body's motor skills. [20] Departing from Itten's pedagogical concerns, in the third experiment, a series of drawings is produced that makes specific conditions of the sensory/motor apparatus visible again, in a different way [fig. 17].
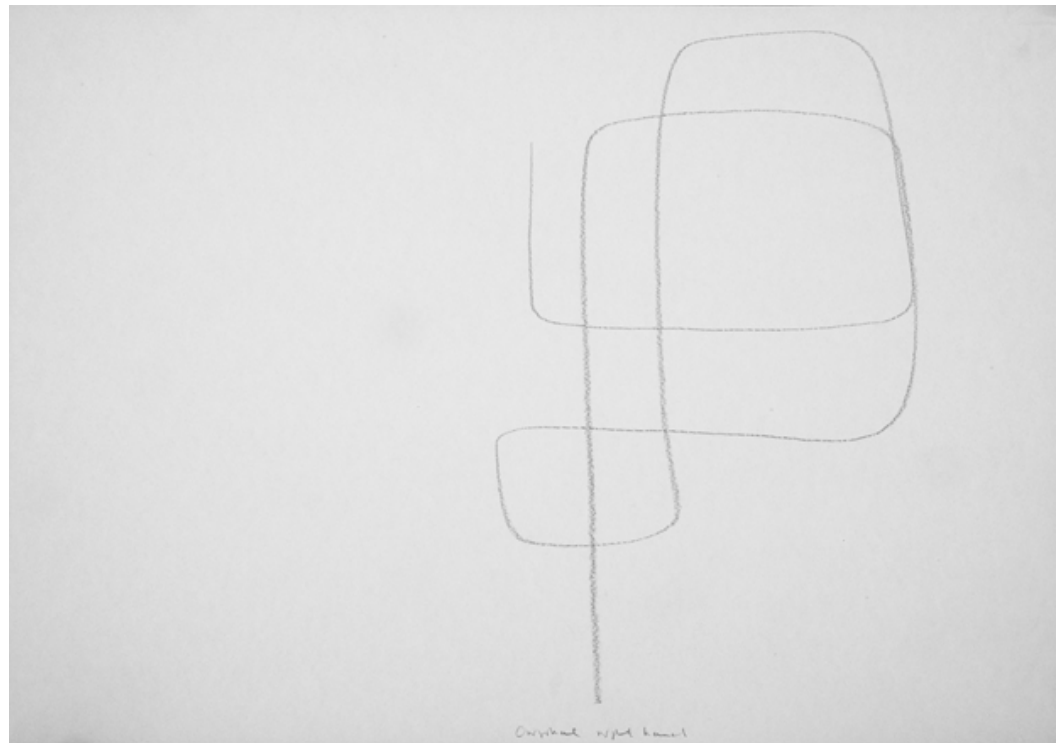
fig.: 17 >

If we attempt to draw the mirror-image of this figure next to it with the same or the other hand, the difficulty of this second undertaking can clearly be seen [fig. 18/19].
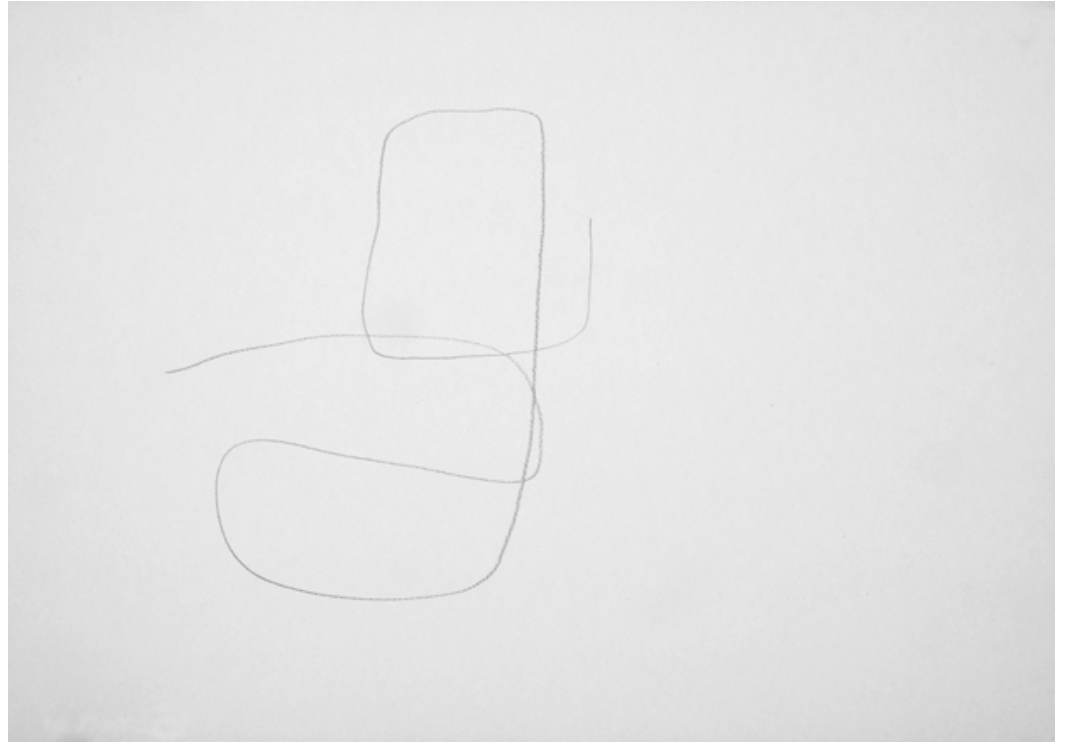
fig.: 18 >
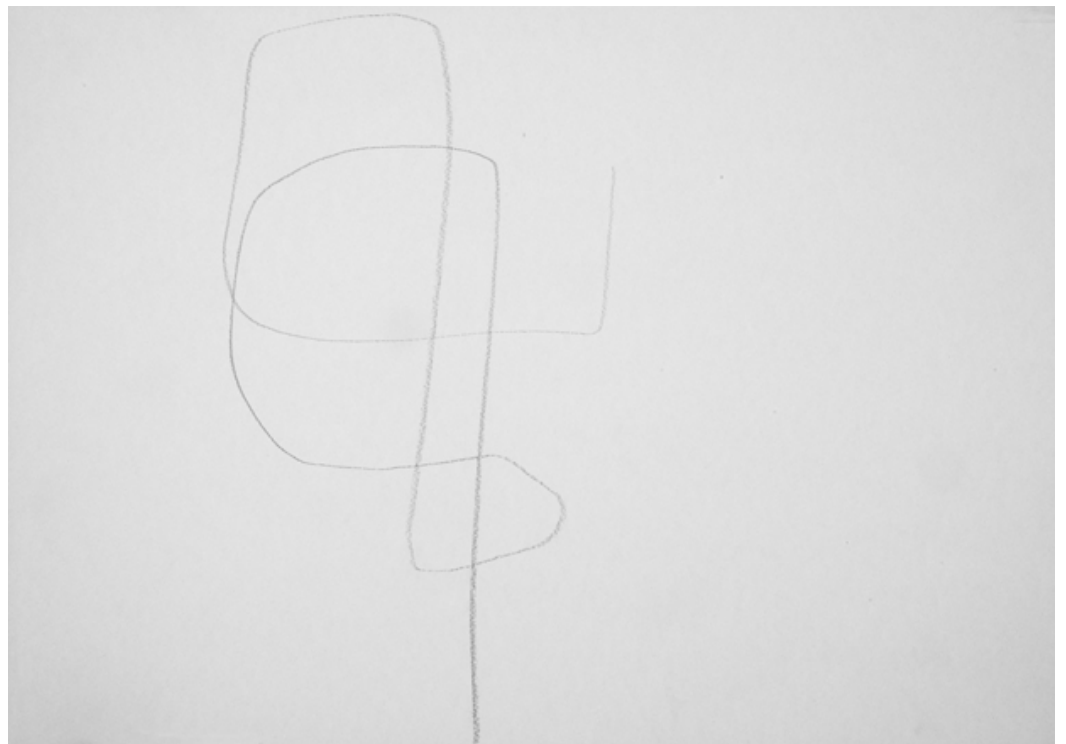
fig.: 19 >

The difficulty of executing a mirror-image drawing is demonstrated in the drawing's process and result. However, if we attempt to produce the original drawing and its mirror image simultaneously in a single act of drawing, the effect is quite different. If we draw the figure with the preferred hand and its mirror image with the other hand, then, by concentrating on the preferred hand, we can easily render the mirror image with astonishing precision, using the hand lacking in motor training, at the same time as we draw its unreflected counterpart [fig. 20].
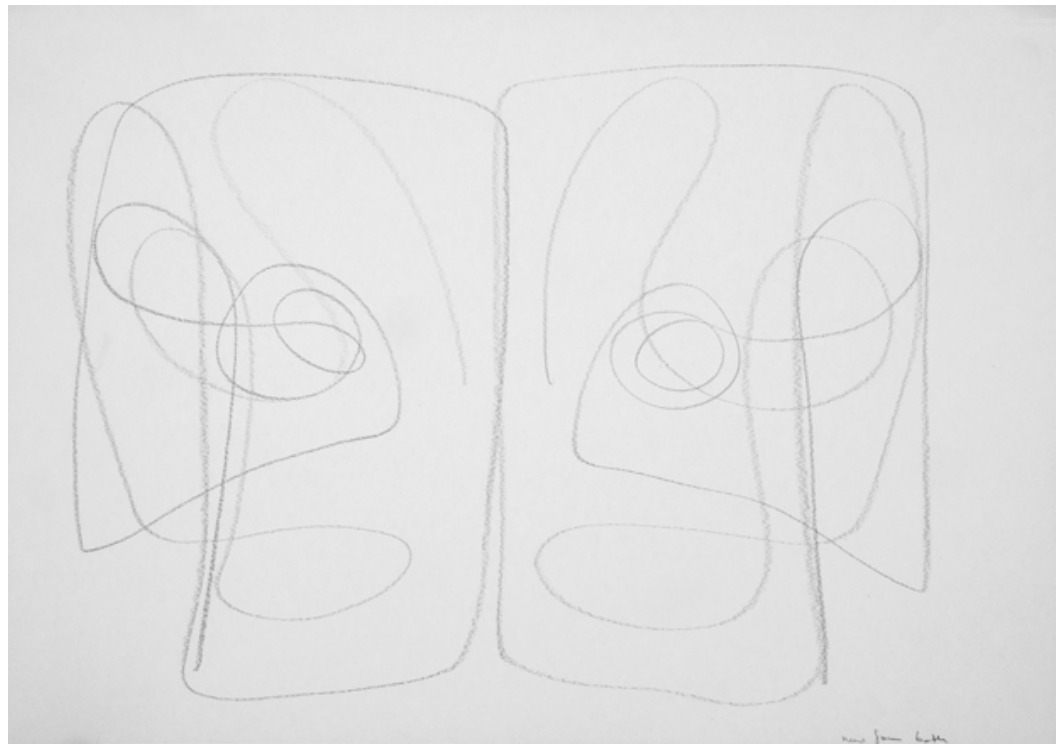
fig.: 20 >

This experiment shows that the constellation of our sensory/motor apparatus is evidently structured in such a way as to favor a reflection of the arm movements through our body's central axis.

Conclusion

The attempt made in this study to analyze the process of image design verbally has shown that this process can only be articulated to a certain extent. Therefore, critical operations in the production of new images must remain concealed from a verbal analysis. The drawing experiments were subsequently employed in order to isolate several non-linguistic design operations; the results of these experiments, in the form of several picture series, provide a basis for recognizing

[21]
Rheinberger, Experimentalsysteme (note 15).

[22]
«Our ability to make new meaning, to enlarge our concepts, and to arrive at new ways of making sense of things…

these operations. In these experiments and the resulting picture series, it becomes visible how, through the physical constellation of the body (arm movement), through experience with translating a concrete situation into a drawing in 10 seconds (training the hand), and through the preference of the sensory/motor apparatus for symmetrical movement (ambidextrous drawing), it is possible to guide decisions made beyond the threshold of consciousness. The differentiated empirical analysis, through the drawing itself, of the operations that come into play in the drawing process indicate the lack of specificity of terms such as *implicit knowledge, intuition,* and *chance* in the context of the genesis of images.

If we return to our original comparison between critical thinking about images as an exercise in language and critical thinking about images as carried out in the design process, it is evident that the processes are analogous in that, in each, many decisions (and therefore differentiations) are made concerning images. However, in the experiments in this study, the primary concern was not the achievement of an aesthetically appealing picture, but rather the systematic analysis of processes through the experimental system [21] of design. Familiarity with the forces that influence decisions made during the process of image creation make it possible, for example, to employ the drawing process experimentally in order to develop answers to concrete questions about the meaning of images. [22]

An important factor in the unique potential of design is the explicit interaction of decisions, differentiations, and categorizations beyond the threshold of consciousness and conscious decisions, which comprise the boundaries of the unconscious aspects of the process. The unconscious decisions, which remain closed off from direct verbal description, are only manifest as a trace of decisions in the image or the production process itself. They are related to conscious processes of decision, and they are not the products of chance, nor are they purely individual. Like language, they are subject to the cultural milieu, the influence of the group, and the conditions of the individual's corporeality. However, they provide an avenue of access to the image that is not diverted through language. An iconic criticism structured around the activity of design is therefore primarily a nonverbal — thus, mute — criticism, which opens up visual fields of possibility through the systematic design of images, and thereby both generates and evaluates images that cannot be anticipated. In this way, it contributes to the entire project of iconic criticism.

To what extent the systematic but experimental image series can productively be translated into language will only be demonstrated

through a more thorough investigation. The question of whether a method for investigating the meaning of images can be derived from the basic principles of design research presented here is likewise the object for a more thorough study of image creation processes. The diversity and individuality (or generalizability) of these processes poses another challenge for this area of research.

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Endnotes

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Fritz Mauthner, *Wörterbuch der Philosophie* (Leipzig 1923), vol. 2, p. 257.

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Ralf Konersmann «Die Augen der Philosophen: Zur historischen Semantik und Kritik des Sehens,» in *Kritik des Sehens,* ed. Konersmann (Leipzig 1997), 12.

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David Bohm, *On Creativity* (New York 2007), 154–155.

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Gui Bonsiepe, «The Uneasy Relationship between Design and Design Research,» in *Design Research Now,* ed. Ralf Michel (Basel 2007), 25.

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George Lakoff and Mark Johnson, *Methaphors We Live By* (Chicago 2003); *Philosophy in the Flesh: The Embodied Mind and its Challenge to Western Thought* (New York 1999).

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Lakoff and Johnson, *Methaphors,*10 (note 5); Johnson, *The Meaning of the Body: Aesthetics of Human Understanding* (Chicago 2007), 139.

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«Under certain specifiable conditions, we have a qualitative awareness of our sensations and emotional responses. Such awareness is called a feeling.» Johnson, *The Meaning of the Body,* 56 (note 6).

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«An Image Schema is a dynamic, recurring pattern of organism-environment interactions. As such, it will reveal itself in the contours of our basic sensorimotor experience. Consequently, one way to begin to survey the range of image schemas is via a phenomenological description of the most basic structures of all human bodily experience.» *Ibid.,* 136.

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See *ibid.,* 178.

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See *ibid.,* 31.

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«The body is the vehicle of being in the world, and having a body is, for a living creature, to be intervolved in a definite environment, to identify oneself with certain projects and be continually committed to them.» *The Phenomenology of Perception,* trans. Colin Smith (London and New York: Routledge, 2003), 94.

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Srini Narayanan, *Sensory-Motor Representations for Metaphoric Reasoning: About Event Descriptions* (Berkeley 1997).

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By referring to the «iconic gensture» described by Michael Tomaseelo, I do not intend to equate the gesture of drawing with the iconic gesture (i.e. the gesture of pantomime), but rather to emphasize the similar motivations of each.
Michael Tomasello, *Origins of Human Communication* (Cambridge, MA 2008), 66, 322.

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Ibid., 324f.

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Also see Hans-Jörg Rheinberger, *Experimentalsysteme und epistemische Dinge: Eine Geschichte der Proteinsynthese im Reagenzglas* (Göttingen 2002), 145.

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«Hence, it is not overambitious to detect in the poetics of the ‹open› work—and even less so in the ‹work in movement›—more or less specific overtones of trends in scientific thought. For example, it is a critical commonplace to refer to the spatiotemporal continuum in order to account for the structure of the universe in Joyce's works. Pousseur has offered a tentative definition of his musical work which involves the term ‹field of possibilities.› In fact, this shows that he is prepared to borrow two extremely revealing technical terms from contemporary culture. The notion of ‹field› is provided by physics and implies a revised vision of the classic relationship between

cause and effect as a rigid, one-directional system: now a complex interplay of motive forces is envisaged, a configuration of possible events, a complete dynamism of structure. The notion of ‹possibility› is a philosophical canon which reflects a widespread tendency of contemporary science; the discarding of a static, syllogistic view of order, and a corresponding devolution of intellectual authority to personal decision, choice, and social context.» Umberto Eco, *The Open Work*, trans. Anna Cancogni (Cambridge, MA: Harvard University Press, 1989), 14-15.

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In this regard, reference can also be made to *disegno.* In a discussion of Vasari's second edition of Vasari's *Lives* (1560), Wolfgang Kemp demonstrates how the concept of *disegno* is divided into two realms: an intellectual realm, which generates the *concetti,* and a manual realm, which realizes them. See Wolfgang Kemp, *Kemp-Reader* (München 2006), 156.

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Michael Polanyi, *The Tacit Dimension,* (Garden City 1966).

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«The gesture [of painting] is not only a reaching out of the present into the future; it is also an anticipation of the future in the present, and the present's retroactive designing into the future. It is a constant assessment and reformulation of its own meaning. This means the analysis of the gesture [of painting] shows the analysand that he must put himself into the gesture if he wants to solve its mystery. The understanding of the gesture must be an understanding of the self.» Vilém Flusser, *Gesten: Versuch einer Phänomenologie,* (Düsseldorf 1996), 116. Translated here. Also see James Elkins, «Marks, Traces, ‹Traits›, Contours, ‹Orli›, and ‹Splendores›: Nonsemiotic Elements in Pictures,» *Critical Inquiry* 21/4 (Summer 1995): 822-860.

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Rainer Wick, *Bauhaus Pädagogik* (Cologne 1982), 88f.

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Rheinberger, *Experimentalsysteme* (note 15).

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«Our ability to make new meaning, to enlarge our concepts, and to arrive at new ways of making sense of things must be explained without reference to miracles, irrational leaps of thought, or blind impulse.

We have to explain how our experience can grow and how the new can emerge from the old, yet without merely replicating what has gone before.»
Johnson, *The Meaning of the Body*, 13 (note 6).

Image captions

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schematic representations of design processes, in Hugh Dubberly, *How do you Design* (San Francisco 2004).

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study drawing: ellipse produced in vector drawing program, 2010. Laser printout, A3, 42 x 29.7 cm, photo archive of the Visual Communcation Institute, HGK FHNW.

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study drawing: traced ellipse, 2010. Pencil on paper, A2, 59.4 x 42 cm, photo archive of the Visual Communcation Institute, HGK FHNW.

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two study drawings: forms developed freely from the drawing movement, without corrections, 2010. Pencil on paper, A2, 59.4 x 42 cm, photo archive of the Visual Communcation Institute, HGK FHNW.

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study drawing: ellipses developed from the drawing movement, without corrections, without assistive devices, 2010. Pencil on paper, A2, 59.4 x 42 cm, photo archive of the Visual Communcation Institute, HGK FHNW.

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study drawing: the ellipse as an element of analytical drawing, 2010. Pencil on paper, A2, 59.4 x 42 cm, photo archive of the Visual Communcation Institute, HGK FHNW.

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study drawing: programmed ellipse, 2010. Laser printout, A3, 42 x 29.7 cm, photo archive of the Visual Communcation Institute, HGK FHNW.

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Indre Grumbinaite, series 1: four nature studies executed in 30 minutes, 10 minutes, one minute, 10 seconds (from left to right), 2010. Pencil on paper, each drawing A3, 42 x 29.7 cm, photo archive of the Visual Communcation Institute, HGK FHNW.