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Neuroästhetik

Perspektiven auf ein interdisziplinäres
Forschungsgebiet

Beiträge des Impuls-Workshops
am 15. und 16. Januar 2010 in Aachen

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Neuroästhetik bezeichnet eine junge Forschungsrichtung, die nach dem neuronalen Substrat ästhetischer Erfahrung fragt. Ihr Interesse gilt der Erforschung der neuronalen Prozesse bei der Wahrnehmung sowie bei der Produktion von Kunst. Diese zunächst nur auf die Hirnforschung begrenzte Fragestellung tangiert jedoch zentrale Themenfelder anderer Disziplinen: Die Frage nach künstlerischen Schaffensprozessen fällt in die Kompetenzbereiche der Kunst-, Musik- und Literaturwissenschaft, die ethischen Implikationen – die Hypothese, Ästhetik folge biologischen Mustern, berührt letztlich die Frage nach der künstlerischen Freiheit – betreffen Themen der Philosophie und Politologie.

Unter dem Titel *Neuroästhetik* fand am 15. und 16. Januar 2010 im Human Technology Centre der RWTH Aachen University ein interdisziplinärer Workshop statt, die meisten Tagungsbeiträge sind in diesem Band dokumentiert. Die Veranstaltung war im Format eines Impuls-Workshops konzipiert, d.h. im Anschluss an die Kurzvorträge war viel Raum für Diskussion. Die Zielsetzung bestand in einer Sammlung und Sichtung unterschiedlicher Perspektiven auf das Feld der Neuroästhetik. Vor allem ging es darum, naturwissenschaftliche, empirische Paradigmen einerseits und geisteswissenschaftliche, hermeneutisch orientierte Paradigmen andererseits in einen fruchtbaren Dialog zu bringen.

Die Initiative zu dem zweitägigen Workshop ging aus vom interdisziplinären Projekt *Brain/Concept/Writing*,¹ dessen Erkenntnisinteresse literarischen Schaffensprozessen gilt. Das Projekt versteht sich insofern auch als Beitrag zum weiten Feld der Kreativitätsforschung. So verfolgt das Projekt *Brain/Concept/Writing* mit großem Interesse die Fragestellungen der Neuroästhetik sowie die Debatte um dieses junge Forschungsfeld. Hier scheinen viele der Fragen gestellt zu werden, die auch das Projektteam im Dialog zwischen Literatur- und Neurowissenschaften immer wieder beschäftigen.

Die Möglichkeiten der bildgebenden Verfahren in den Neurowissenschaften haben spektruläre Erkenntnisse geliefert und dadurch zahlreiche Versuche nach sich gezogen, diese Verfahren auch auf andere Bereiche anzuwenden; so gibt es heute nicht nur eine Neuroästhetik, sondern auch eine Neuroökonomie, ein Neuromarketing, eine Neuroethik, eine Neurotheologie etc. Feige beobachtet, „dass Phänomene, die traditionell in das Ressort der Geistes- und Kulturwissenschaften fallen, systematisch in die Reichweite der empirischen und theoretischen Mittel naturwissenschaftlicher Forschung gerückt werden. Für viele Gegenstandsbereiche, deren Analyse noch in den

¹ Das Projekt *Brain/Concept/Writing* läuft seit März 2009 unter Leitung von Karin Herrmann am Human Technology Centre (kurz: HumTec) der RWTH Aachen University. Beteiligte Disziplinen sind die Literaturwissenschaft, die Neurowissenschaften sowie die Informatik.

Focus on Form: Reflections on the (Neuro)Aesthetics of Abstraction in Painting and Gesture

Irene Mittelberg

1. Aesthetic Qualities in Different Semiotic Systems

Artists tend to pay particular attention to formal aspects of expression. Painters, poets, actors, dancers and others all devote great care to developing their proper techniques to give content (e.g. ideas, emotions, mental states, or impressions) a form, or to execute movements with a certain degree of well-formedness. In abstract art, such as Cubism, the representation of content might be backgrounded, while the aesthetic quality of form and structure comes to the fore. This paper proposes a comparative study of the *poetic function*¹ in Modern painting and spontaneous coverbal gestures. According to the Russian linguist and semiotician Roman Jakobson, the poetic (or aesthetic) function implies a focus on the message sign itself, that is, on the formal properties of an utterance, a text, a movement, or a visual image, and less on referential meanings.² For instance, the repetitive use of similar sounds, shapes, or movements across the same message sign may evoke a sense of rhythm and unity in the observer or listener. In other words, the principle of equivalence motivates not only the sign carrier chosen to express an idea, but first and foremost formal, material and compositional aspects. In Russian Formalism and Abstract Expressionism especially, material qualities often are the main concern: color as such, color combinations, the texture of thick paint deployed on a canvas with broad brush strokes, or countless fine layers of different shades of colors. While these effects result, in a way, from painting gestures in the larger sense, the following observations will focus on speech-accompanying gestures, not interacting with any surface or tool, but unfolding freely in space and time.

Exploring the poetics of the embodied mind³ necessarily involves some of the major figures of thought, such as metaphor and metonymy, which have been shown to be rooted in the human conceptual system, and to drive both ordinary and creative forms of expression in different media.⁴ Taking a neuroaesthetic perspective,⁵ the questions posed in this short paper address the cognitive-emotional pleasure that aesthetic messages, or, performances, may evoke in the interpreter; connections to neural underpinnings will also be sketched. We shall ask, for example, whether 'poetic gestures' may help individuals with neurological impairments or psychiatric disorders to focus on the pertinent parts of a multimodal message and/or retrieve relevant information from memory.

¹ Cf. Jakobson (1960).

² Cf. Waugh (1985).

³ Cf. Gibbs (1994; 2006); Lakoff/Johnson (1999).

⁴ Cf. Johnson (1987); Fauconnier/Turner (2002); Lakoff/Turner (1989); Sweetser (1992); Taub (2001).

⁵ Cf. Dresler (2009).

This paper suggests that in both semiotic systems, i.e., Cubist painting and gesture, the poetic function is to a large degree propelled by metonymy (e.g., synecdoche), which as a cognitive-semiotic principle lies at the heart of abstraction. It will further be of interest to identify and compare some of the factors which seem to motivate processes of sign formation and interpretation in both cases, to find out which features of basic objects, actions, and concepts tend to be selected for representation and which seem to be omitted. Given the limited scope of this paper, these aspects and questions can only be discussed at a rather general level.

2. Figures of Thought: Metaphor and Metonymy

Why Cubism, gesture, and metonymy? Inspired by Peirce's⁶ concepts of similarity and contiguity, Jakobson⁷ viewed metaphor (based on similarity), and metonymy (based on contiguity) as two major modes of association, interacting in most processes of signification, be they ordinary or artistic. In the expression 'the saxophone has the flu today', the musical instrument 'saxophone' stands for the person who usually plays it. Musician and instrument are contiguous in the context of playing music, or, put in cognitive linguistics terms, they are part of the same conceptual domain or frame.⁸ Jakobson understood synecdoche as a subtype of metonymy, where a part stands for the whole, such as 'there are many bright heads in the group' (the head stands for the entire person). Metaphor, by contrast, presupposes a cross-domain mapping: in 'his argumentation was crystal clear', a term stemming from visual perception describes intellectual clarity.⁹

Drawing on diverse languages, literature, aphasia, and the visual arts, Jakobson argued that certain poets and art schools exhibit a tendency for either the metonymic or metaphorical style. Cubism, for instance, appears to be inherently metonymic in nature,¹⁰ compared to Surrealism, for example, which has a tendency for metaphorical symbolism. Interestingly, Jakobson showed that aphasic language disabilities can be described in light of the ability or disability to draw on relations based on similarity (metaphor) and contiguity (metonymy): *similarity disorder* and *contiguity disorder*.¹¹ Focusing on speech production, he postulated that similarity disorder represents an impairment regarding the use of content words (such as nouns, verbs, and adjectives) and meta-linguistic operations: the inability to substitute words for other words (synonyms or antonyms), "i.e. the raw material of metaphor".¹² As the contiguity mode still operates, function words (such as prepositions, demonstratives and pronouns) and grammatical markers (indicating person, verbal tense, number, etc.), which are indexical and depend on contextualization (contiguity), could be produced. In patients with contiguity disorder, by

⁶ Cf. Pierce (1955).

⁷ Cf. Jakobson (1956).

⁸ Cf. Panther/Thornburg (2007).

⁹ Cf. Lakoff/Johnson (1999).

¹⁰ "[T]he object is transformed in a set of synecdoches" Jakobson (1956), p. 130.

¹¹ Ibid.; Lodge (1977).

¹² Hawkes (1972), p. 77.

contrast, the ability to form correct grammatical constructions is impaired. Content words, however, are still produced, which results in what is generally known as the telegraphic style or agrammatism. In essence, "[m]etaphor is alien to the similarity disorder, and metonymy to the contiguity disorder".¹³ Illustrating a case of similarity disorder, Jakobson pointed out that the Russian poet Uspenskij had a "penchant for metonymy and especially for synecdoche and that he carried it so far that 'the reader is crushed by the multiplicity of detail unloaded on him in a limited verbal space, and is physically unable to grasp the whole, so that the portrait is often lost'".¹⁴ Recent advances in aphasia research and therapy suggest, not surprisingly, a more graded spectrum of symptoms and causes, regarding both speech and gesture and not only language production, but also comprehension.¹⁵ However, Jakobson's way of drawing connections between cognitive, neural, linguistic and artistic phenomena can be said to have inspired some of the subsequent investigations. David McNeill,¹⁶ for example, has suggested that the poetic function manifests itself in the repetitive use of the same gestural elements over a stretch of speech (so-called 'catchments'), thus increasing discourse coherence. Goss¹⁷ identified this poetic device in the discourse of individuals with bipolar disorder.

In the context of bodily semiotics, metonymy has been shown to be one of the key principles in the formation and contextualization of dynamic gestural signs, in each instance leading to schematic and fleeting representations of objects and actions.¹⁸ In the following sections, modes of sign constitution in Cubist paintings and spontaneous gestures will be explored in order to demonstrate that comparing such – at first sight admittedly very different – semiotic systems can illuminate the material and structural properties of each of them and provide insights into the abstractive and imaginative powers of the human mind.

3. Abstracting the Essence: Metonymy in Cubism

While Cubism may count as one of the schools of abstract art par excellence, other styles and artists also deserve to be brought into the picture here. Among the avant-garde artists who have paved the way of increasing abstraction, we should, at least, mention Cézanne, Picasso, Klee and Kandinsky.¹⁹ These artful minds²⁰ have illuminated our understanding of visual perception, representation, and the psychology of art as much as art theorists and historians.²¹ Moreover, this did not happen in a vacuum:

¹³ Jakobson (1990), p. 129.

¹⁴ Jakobson (1990), p. 132, citing Karnegeulov (1930).

¹⁵ Cf. Duncan/Peddy (2007); Grande/Huber (2007); Huber et al. (2006); Lott (1999).

¹⁶ Cf. McNeill (2005).

¹⁷ Cf. Goss (2006).

¹⁸ Cf. Mittelberg (2006; 2008; 2010b); Müller (1998; 2010).

¹⁹ Cf. Gamwell (2002); Morley (2003); Oeser (2009).

²⁰ Cf. Turner (2006).

²¹ Cf. e.g., Arnheim (1969); Gombrich (1960).

"Art is an activity that arises in the context of human cultural and cognitive evolution. Its sources include not only the most abstract integrative regions of the brain but also the communities of mind within which artists and audiences live. The interaction of these sources creates complex cultural-cognitive domains, which are reflected in art. Art and artists are active players in the co-evolution of culture and cognition."²²

As abstract as they might appear, Cubist paintings portray objects taken from concrete and familiar everyday living environments. The signified objects can still be considered as a "slice of life".²³ human figures, furniture, cups, plates and vases, musical instruments, newspapers, etc. When looking at a Cubist painting as in Fig. 1, one is immediately under the impression of a mass of geometrical forms and planes that are represented and composed in a nontransparent fashion. Even a signifier, e.g., the head of a woman or a single eye, is taken apart, and fragments are represented from different viewpoints at the same time, resulting in what has been called "simultaneous vision".²⁴ It is the viewer's task to reunite the bits and pieces of the signifier, to unify the different perspectives and to find the corresponding signified, as if she or he was completing a sort of puzzle.

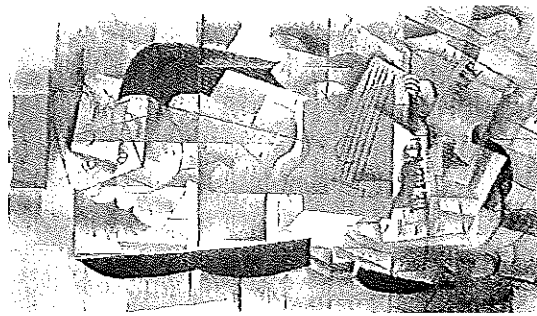


Figure 1: Georges Braque, *Young Girl with Guitar*, 1913 (Musée National d'Art Moderne, Paris).²⁵

²² Donald (2006), p. 3.

²³ Lodge (1977), p. 109.

²⁴ Zeki (1999), p. 52.

²⁵ Read (1985), p. 40.

One of the Cubists' aims was to "discover less unstable elements in the objects to be represented, i.e., the constant and essential elements."²⁶ Objects and human figures are typically transposed into simple geometric forms such as cubes, squares, cylinders, and triangles. Picasso and Braque believed that "the essence of painting was form."²⁷ The principle of equivalence, and thus in a way the poetic function, is instantiated by those basic geometrical forms that function as structural devices creating a pattern within a single Cubist sign as well as across paintings. Such pictorial patterns can be compared with sound patterns, rhyme schemata and metrical structure in poetry.²⁸ In both cases, the created effect exhibits "the promotion of a sense of 'sameness,' of pattern."²⁹ Basically all objects are decomposed into *salient* parts and features such as shapes and contours, standing in for the entire body, head, hand, guitar, table, etc. As such, they demonstrate the *parts pro toto* principle which in turn relies on the mechanism of *déjà-vu*.³⁰ A newspaper can be represented by its name, again partially as in painted or pasted verbal signs such as JOURNAL, a table can be suggested by a piece of the material it is made of, such as the often used *papier faux bois*, and the like.

While synecdoche is the dominant trope here, there are other forms of metonymy, that is, contiguity relations, to be observed in such complex signs. Not only is the constellation of each form (through abstraction) to a high degree afforded by metonymy (here, synecdoche), but also the composition creates a specific kind of grid of contiguity relations among the individual elements. It is exactly this intricate structure of partial representations of objects and human beings that brings about the metonymic character of Cubist art.

4. Gesture: Aesthetic Qualities of Everyday Movements

Gestures depicting entities, structures, and relations may be similarly elliptic and geometric as Cubist signs and other abstract representations. Indeed, some of the prominent hand shapes and movement patterns identified in a corpus of gestures accompanying meta-linguistic discourse have been shown to also evoke basic geometric shapes that take on distinct meanings in different semiotic contexts.³¹ When gesticulating, speakers seem to be handling imaginary, common objects or imitate mundane manual actions that are alluded to by a hand configuration, movement pattern, or a minimal trace drawn in the air. Inspired by techniques artists employ when working with different tools and media, Müller³² introduced four techniques of gestural sign formation ("Darstellungsweisen"): gesturing hands may also *draw*, *mold*, *act*, or *represent* objects and actions, depending on what the speaker intends to illustrate or emphasize.

²⁶ Zeki (1999), p. 50.

²⁷ Wertenbaker (1967), p. 86.

²⁸ Cf. Scobie (1997), p. 101.

²⁹ Hawkes (1977), p. 80.

³⁰ Cf. Lodge (1977), p. 93.

³¹ Cf. Mittelberg (2010a).

³² Cf. Müller (1998; 2010).

It needs to be stressed that in contrast to static, carefully composed paintings, gestures are dynamic, largely unconsciously produced visuo-motor signs that receive their meaning in conjunction with the concurrent speech. While most gestures are performed in a rather sketchy way, certain gestures appear to be executed with more attention to their form and effect. Such gestures seem to be more consciously produced, especially when the gesturer looks at her or his own hands, and chances are higher that the interlocutor notices them, too, due to their well-formedness, extensive use of space, or other expressive qualities that make them stand out.³³ In a given instance of an ongoing discourse, they may portray those attributes of abstract or concrete objects or actions that are pragmatically salient, that is, locally and not necessarily globally essential (as in Cubist signs). Gestures may thus also provide metonymic 'slice[s] of life': not only of the speakers' outer physical living context, but also of their inner life such as their feelings, reasoning and imagination. Research on metaphor in gesture³⁴ has shown that gestures may portray the source domain of a metaphorical mapping such as in a gesture that imitates a downward spiral depicting a sensation of vertigo when talking about a mental state that fits that image. It can also be the case that a metaphorical understanding of an abstract category or process only is portrayed in the gestural modality, while the accompanying speech is non-figurative.³⁵ It has further been suggested that in interpretative processes of verbal gestures metonymy may lead the way into metaphor:³⁶ first the material gestural sign (hand configuration or movement) has to be interpreted as a partial representation of an object or action, before the embodied representation can then be understood as standing for an abstract idea or structure. The spiral movement of a hand mentioned above could also imitate the form of a winding staircase (through iconicity and metonymy), instead of a 'mental or emotional state as described above (through iconicity/metonymy first and then metaphor). In each case, the gesture receives its meaning through the concurrent speech, and in each case the gesture picks out the essential properties of the physical structure or of the movement it depicts based on an effective interplay of iconicity (similarity) and metonymy (contiguity).³⁷

While gesturally evoked rhetorical figures such as metaphor and metonymy can be said to add poetic qualities to dynamic multimodal representations, everyday multimodal performance units can also be rendered comparatively aesthetic by, for instance, increasing the scale of the gesture, aligning the rhythm of the movement with the prosody of the speech, by giving more impetus to the movement, or by slowing down the movement and the speech altogether. Through adopting one or several of these techniques, the focus is placed on the formal properties of a gesture or a sequence of gestures, that is, of spontaneously invoked abstractions of objects or actions. Especially when speech and gesture show equivalent features in terms of prosody and movement execution in the same instance, such a cross-modally achieved formal equivalence may guide the addressee's attention to the gesture itself. Put more generally, we can say that

³³ Cf. Cienki/Mittelberg (f.c.).

³⁴ Cf. Cienki/Müller (2008); Sweetser (1998).

³⁵ Cf. Mittelberg (2008).

³⁶ Cf. Mittelberg/Waugh (2009).

³⁷ Cf. Mittelberg (2010b).

in such a profiled movement the abstracted form itself and the very manner in which it is performed may momentarily create an effect comparable to that of pure color, textured paint, and/or geometrical form and structure in abstract painting: the formal/material properties come to the fore, while issues of representation are not of major concern. Thus, focusing on the form of expression (as in *l'art pour l'art*) may evoke aesthetic qualities in both visual art and bodily semiotics.

5. Concluding Remarks: Some Implications for Neuroaesthetics

In light of the observations sketched above we might ask, for instance, whether different patterns of neural activation arise from observing poetic versus non-poetic gestural movements. Here a link can be made to research on gestures and the mirror neuron system,³⁸ looking at whether the brain-action-perception link plays out differently in each case. The point this paper wishes to make is that gestures appearing comparably well-formed, graceful, or 'elegant' can be said to embody Jakobson's understanding of the poetic (or aesthetic) function. This can apply to both artistic, creative uses of gestures, such as in pantomime, theatre or dance, but also to everyday gestures exhibiting some of the poetic qualities discussed above.

Possible avenues to investigate these phenomena within the context of neuroaesthetics would be to see whether A) non-poetic versus poetic forms in paintings and gestures evoke different neural correlates, B) whether individuals with different disorders process metonymically abstracted signs equally well or badly, C) whether providing the essential elements of concepts, objects, and actions through abstract drawings or gestures may help individuals with these disorders to better grasp the concept in question, and D) whether the aesthetic quality of gestures may turn out to be a dimension of conceptualization and communication one could make systematic use of for therapeutic purposes. With respect to art therapy, it would be interesting to identify preferences for similarity or contiguity relations in individuals and then present them with representations of either style to see whether there are tendencies in the appreciation of a certain art style (drawing heavily on either metonymic or metaphoric elements and principles of combination of elements). While work on art appreciation has been done from neurological and/or neuro-scientific perspectives,³⁹ there is still much room for research in the domain of gesture appreciation. One promising way to investigate aesthetic qualities of everyday movements would be to combine brain imaging and motion capture technologies.

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³⁸ Cf. e.g., Skipper et al. (2007).

³⁹ Cf. e.g., Buk (2009).

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„Schlüsse über Schlüsse“: Zur Struktur der Schlussgebung in Literatur und Kultur

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1. Relevanz der Schlussgebung, theoretische Hintergründe, Forschungsstand

Der Schluss ist – semiotisch, kognitionspsychologisch und literaturwissenschaftlich betrachtet – eines der sich am stärksten einprägenden und bedeutungsträchtigsten Elemente eines literarischen Werks oder kulturellen Artefakts. Die besondere Relevanz des Schlusses ergibt sich nicht nur aus seiner text- oder handlungsabgrenzenden Funktion, sondern auch aus seiner entscheidenden Rolle bei der Rezeptionssteuerung und Informationsverarbeitung, ist doch die Funktionalität eines Textbausteins, Handlungsselements oder Ereignisses im Kontext des Ganzen immer erst am Ende verlässlich einschätzbar¹ – wie insbesondere Texttypen wie der Witz oder die pointierte Erzählung zeigen, deren Effekt auf einem abschließenden *frame*-Wechsel beruht.² Der Schluss ist somit auch die Stelle, an der bevorzugt Normen etabliert, Botschaften vermittelt, Konventionen inszeniert oder durch Ironisierung und Parodisierung kritisch hinterfragt werden.³

Dennoch hat die Struktur von Schlüssen in den Literatur- und Kulturwissenschaften bislang eher wenig Beachtung gefunden. Selbst in renommierten literatur- und kulturwissenschaftlichen Nachschlagewerken findet sich zu Begriffen wie *ende*, *endings*, *closure* bzw. *Ende* und *Schluss* in der Regel kein Eintrag.⁴ Wie bei allen literatur- und kulturwissenschaftlichen Gegenständen erklärt sich auch in diesem Fall die Forschungskonjunktur aus den großen Paradigmenwechseln der Literatur- und Kulturtheorie. Unter den Vorzeichen einer konstruktivistischen Ästhetik und strukturalistisch-semiotischen Textauffassung stellte sich die Schlussgebung noch als ein wichtiges, weil universal gegebenes und allgemein beschreibbares Strukturelement dar. So hat etwa, in Fortschreibung von Edgar Allan Poes Einsicht in die strukturbestimmende Relevanz eines *single effect* am Ende der Kurzgeschichte, bereits der russische Formalist Boris Ejchenbaum (1925) auf das besondere Gewicht des Schlusses bei den kurzen Erzählformen aufmerksam gemacht.⁵ Auch bei dem sowjetischen Semiotiker Juuij Lotman findet sich der Hinweis, dass „die bedeutungsträchtigsten Elemente der poetischen Struktur meist an den Enden der Segmente, (des Verses, der Strophe, des Kapitels, des

¹ In der kognitionswissenschaftlich orientierten Literaturtheorie hat sich hierfür seit Meir Sternberg (1978) der Terminus *recency effect* eingebürgert.
² Vgl. Wenzel (1989).
³ Vgl. Gutenberg (2000), S. 111.
⁴ Zu den wenigen Ausnahmen zählt das renommierte Metzler Lexikon Literatur- und Kulturtheorie (2008), allerdings auch erst seit seiner zweiten Auflage (2001).
⁵ Vgl. Ejchenbaum (1925), p. 231: „By its very essence, the story just as the anecdote, amasses its whole weight toward the ending.“