

CONTROVERSY

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Neuroscience and the Study of Literature. Some Thoughts on the Possibility of Transferring Knowledge

The discussion of two different approaches to the study of literature lies at the heart of the debate between Frank Kelleter and Karl Eibl.¹ Our contribution is intended to shift the focus of the discussion by suggesting that attention be given above all to the issues surrounding the cross-disciplinary transfer of knowledge and the legitimacy of adopting knowledge from one discipline in another.² We analyse a recent example of knowledge transfer, Gerhard Lauer's essay ›Spiegelneuronen: Über den Grund des Wohlgefallens an der Nachahmung‹ (›Mirror Neurons: On why we Enjoy Imitation‹, Lauer 2007),³ and then draw some general methodological conclusions about the possibility of transferring knowledge from neuroscience and cognitive science to the study of literature.

1. Mirror Neurons: An Example of Knowledge Transfer

On the basis of research on primates it has become widely accepted among neuroscientists that there are strong indications that mirror neurons are present in the human brain, too (Rizzolatti/Craighero 2004; Rizzolatti 2005).⁴ A certain amount

¹ The dispute between Frank Kelleter and Karl Eibl (Kelleter 2007, Eibl 2007, Kelleter 2008) is representative of the contemporary debate; see also the many contributions to the anthology *Im Rücken der Kulturen* (›Behind Culture‹; Eibl, Mellmann, Zymner 2007).

² Kambas 1996 is one of the few cases in which these issues are discussed from the perspective of the study of literature.

³ References to Lauer 2007 will be given as page numbers in parentheses in the text; any emphasis in the quotations is our own. – Translator's note: the German *Nachahmung* can be used both to render the Aristotelian term ›mimesis‹ and, like its companion verb *nachahmen*, to refer to imitation in the wider sense of the word. This flexibility allows Lauer and the authors of the present article to underline the connection between mimesis in particular and the human ability to imitate in general. In the English translation, the words ›imitation‹, ›imitate‹, ›imitating‹, and so on have been used to render *Nachahmung* and its related forms (*Nachahmen*, *nachahmen*), except in those few cases where the sense of artistic mimesis is predominant.

⁴ We are dealing with indications in so far as the activity of individual neurons in the brain can be measured directly with the help of electrodes in monkeys, whereas only indirect methods such as

of enthusiasm for the mirror neurons discovered by neuroscientists can be observed in the study of literature in the recent past. Traditional concepts of literary and cultural studies such as empathy, identification, imitation, mimesis, mimicry, simulation, sympathy, and emotional contagion have been reformulated on the basis of the discovery of mirror neurons. The findings of neuroscience have been understood as drawing attention to a deep-seated human ability to empathize that, as Keen 2007 has suggested, can be treated as underpinning the narrative empathy that can be produced (or elicited) by particular kinds of characterization or types of focalization in literary texts.

In his essay ›Spiegelneuronen: Über den Grund des Wohlgefallens an der Nachahmung‹ (›Mirror Neurons: On why we Enjoy Imitation‹), Gerhard Lauer provides an accomplished and balanced account of the discussion of mirror neurons in the specialist literature. At a crucial point in the essay, he draws attention to the fact that even »simply talking about an action« (›das bloße Reden über eine Handlung‹) leads »those same action nerve cells to resonate that would also fire if the action itself were to be carried out. In this way, spoken actions are carried out inside us in a kind of spontaneous simulation« (›zu einer Resonanz derjenigen Handlungsnervenzellen, die auch feuern würden, wenn die gleiche Handlung selbst vollzogen würde. Gesprochene Handlungen werden so in einer Art spontanen Simulation in uns selbst vollzogen«, 150). This, he says, indicates that literature (as spoken and written language) is also linked to the processes of imitation that can be correlated with the firing of mirror neurons. According to Lauer, processes of imitation can be set in motion not only when the actions of others are visually perceived but also when (literary) descriptions of the actions of others are read. Lauer links this belief to the hypothesis that literature consists of »stories to imitate« (›Nachahmungsgeschichten‹): literature ›feeds our imitation instinct. Mirror neurons explain why we need this sustenance and what conditions have to be met for literature to fulfil this function« (›ist Nahrung für unseren Nachahmungsinstinkt. Die Spiegelneuronen erklären, warum wir diese Nahrung brauchen und welche Bedingungen erfüllt werden müssen, damit Literatur diese Funktion erfüllen kann«, 137).

Lauer's account is as careful as it is ambitious. A considerable amount of space would be needed to give it the attention it deserves, so we will limit ourselves in the present context to discussing briefly what we feel are two objections to the attempt to establish a connection between mirror neurons and the study of literature. It should be made clear that these objections are not to be interpreted as a fundamental rejection of the project of providing the study of literature and culture with a

functional magnetic resonance tomography (Tremblay et al. 2004), magnetoencephalography (Hari et al. 1998), and electroencephalography (Cochin et al. 1999) have been used in humans to date.

grounding in the human sciences as described by, for example, Eibl 2007.⁵ Instead, we mean to put forward ideas that could stimulate and inform the future course of the current debate in the study of literature. Our first objection concerns the explanatory value of research on mirror neurons, the second the scope of the explanations to be found in the proposed grounding of the study of literature in the human sciences.

Our first objection boils down to the fact that it has not as yet proved possible to ascribe the presence of mirror neurons with an explanatory function in the context of the project pursued by Lauer. This is connected to the fact that the mechanism that brings mirror neurons to fire has not yet been identified. The precise effect that these neurons have when they fire has not yet been identified either. What we know is that mirror neurons fire both when a particular action is performed and when that action is observed. Under certain conditions, the firing of these neurons is a neuronal correlate of the action itself, irrespective of who performs it, and not a correlate of the associated motor plan (as was previously thought because of the location of the neurons in the premotor region of the brain).⁶ Even so, on the basis of current knowledge, it is possible to speak only in terms of correlations, not in terms of causes or mechanisms. In particular, this is so in the case of feelings such as the pleasure of imitation to which Lauer draws attention: as things stand, it is not possible to say whether the mirror neurons cause the pleasure of imitating or the pleasure of imitating causes the mirror neurons to fire, or whether both are caused by a third (unknown) mechanism. We know neither the mechanism that brings the neurons to fire nor the mechanism that gives rise to the pleasure of imitating inside us. We can say only that there is a correlation between the two. This is not to deny that the discovery of mirror neurons is of interest in the context of the project outlined by Lauer. It was already known that people imagine actions, that is to say, that they are able to represent them in their brains in some way or another; the discovery of a neuronal correlate is the first step on the way to understanding the causes and mechanisms of this ability. It would, however, seem premature to draw conclusions about fundamental causes and mechanisms from the findings of the studies in question.

Lauer's position is in principle correct when he says that humans are endowed with »a neuronal mechanism that allows them to link actions and mental images of the self with perceptions and mental images of another. This link is created by mimesis in the widest sense of the word. We can mind-read because we imitate.

⁵ Even so, the project faces major methodological problems that cannot be discussed in the context of this article for reasons of space (see Hüttemann 2008).

⁶ There seems, analogously to the mirror system for motor actions, to be a mirror system for »strong« emotions such as pain (Singer et al. 2004) or disgust (Carr et al. 2003, Wicker et al. 2003); it is thought to play a role in how we empathize with the emotions of other people (Gallese/Keysers/Rizzolatti 2004).

Mirror neurons are the neuronal correlate of this imitation« (»einen neuronalen Mechanismus, der es ihm ermöglicht, Vorstellungen und Handlungen des Selbst mit Vorstellungen und Wahrnehmungen des anderen zu überbrücken. Diese Überbrückung leistet die Nachahmung im weitesten Sinn. Wir können Bewusstsein lesen, weil wir Nachahmer sind. Neuronales Korrelat dieser Nachahmung sind die Spiegelneuronen«, 144). This correlation, however, tells us nothing about functions and mechanisms, though Lauer seems to believe it does exactly that when he observes elsewhere that »the way in which mirror neurons function *explains* why actions can still be imitated correctly even when there are flaws in their execution« (»die Funktionsweise der Spiegelneuronen *erklärt*, warum Handlungen, selbst wenn sie fehlerhaft ausgeführt werden, dennoch richtig nachgeahmt werden«, 141) and that mirror neurons »*mediate* between the feelings of the self and the separate feelings of the other and thereby provide an *explanation* for the theory of mind« (»zwischen den eigenen Empfindungen und dem davon unterschiedenen Empfinden des anderen [...] *vermitteln* und damit eine *Erklärung* für die Theory of mind [...] liefern«, 141–142).⁷ As Lauer emphasizes when referring to the ability of newborn children to imitate (146), imitation is, »in humans at least, always intertwined with culture and is itself the foundation of culture« (»mindestens beim Menschen immer auch kulturell durchdrungen und selbst die Grundlage von Kultur«, 147). Stating that imitation functions only »because, in metaphorical terms, the *mechanism* of mirror neurons allows exteroception and proprioception to speak the same language« (»weil über den *Mechanismus* der Spiegelneuronen Exterozeption und Propriozeption – metaphorisch gesagt – dieselbe Sprache sprechen«, 146) is therefore problematic in so far as the mechanism in question has not yet been identified. Simply knowing that mirror neurons exist does not mean that we understand it.

Lauer summarizes his hypothesis with precision at the end of his essay as follows: »The hypothesis that the human being is an *animal poeta* because it imitates may not as such be new. The fact that we find pleasure in imitation, that we cultivate it as literature, is unlikely to be a new insight either. What is new is *how this is accounted for*« (»Die Hypothese, dass der Mensch ein *animal poeta* ist, weil er ein nachahmendes Wesen ist, mag selbst nicht unbedingt neu sein. Auch dass wir Freude an der Nachahmung haben, sie als Literatur kultivieren, dürfte keine neue Einsicht sein. Neu ist ihre *Begründung*«, 158). Our first objection can be reformulated as follows with reference to this summary: the existence of mirror neurons on its own is not enough to explain or account for why humans find pleasure in imitation. Certainly, the fact that humans find pleasure in imitation seems to depend on humans having a basic ability to imitate. The work that has so far been carried out on

⁷ Some of those who advocate the simulation theory of mind support the view that the discovery of mirror neurons is equivalent to an *experimentum crucis* that provides an empirical basis on which to choose simulation theory over the alternative of theory-theory (Gallese/Goldman 1998).

mirror neurons allows us to obtain preliminary insights into the neuronal correlates that can be measured when this human ability to imitate is activated. Seen in this way, the fact that humans find pleasure in imitation is consistent with the results of research on mirror neurons. This does not, however, mean that mirror neurons *explain* why we experience the pleasure of imitation. Lauer postulates a causal connection when he stresses that literature consists of »stories to imitate« (»Nachahmungsgeschichten«): »The reason why they please us is to be found in mirror neurons and the mechanism of imitation associated with them. Put more metaphorically: literature feeds our imitation instinct« (»Der Grund des Vergnügens an ihnen liegt in den Spiegelneuronen und dem mit ihnen verbundenen Mechanismus der Nachahmung. Metaphorischer formuliert: Literatur ist Nahrung für unseren Nachahmungsinstinkt«, 152). It is in mirror neurons that Lauer finds the »reason why we enjoy imitation« (»Grund des Wohlgefallens an der Nachahmung«, 158). That we have an imitation instinct is undisputed, but it does not immediately follow that when we activate this instinct we also experience pleasure, which is what the following sentence suggests: »Literature attracts our attention when it stimulates our imitation instinct. There is nothing we can do better and nothing that interests us more, for that instinct is what made us what we are« (»Literatur weckt unsere Aufmerksamkeit, wenn sie unseren Nachahmungsinstinkt herausfordert. Nichts können wir besser und nichts interessiert uns mehr, denn durch ihn sind wir geworden, was wir sind«, 155).

The significance of mirror neurons was assessed and summarized as follows in the scientific article where their accidental and surprising discovery was first reported: »Although our observations by no means prove motor theories of perception, nevertheless they indicate that in the premotor cortical areas there are neurons which are endowed with the properties that such theories require« (di Pellegrino et al. 1992, 179). According to this article, mirror neurons prove to be compatible with theories according to which perceptions of gestures and language are represented in the brain as invariant movement plans. An analogous statement could be made about the relationship between empathy or imitation on the one hand and mirror neurons on the other. The discovery of mirror neurons is of relatively little assistance when it comes to explaining why or because of what empathy or imitation is triggered; instead, mirror neurons are a neuronal correlate of empathy or imitation, one whose properties are *compatible* with the theories of empathy or imitation that have already been established. As long as the results obtained in neuroscientific studies do not give rise to implications that, from the perspective of the study of literature, require established concepts of empathy and imitation to be revised, it seems likely that their relevance for work in the study of literature as a whole will be relatively insignificant. Nonetheless, we can hope that future work in neuroscience will, taking the study of mirror neurons as its starting point, lead to a deeper understanding of the physiological causes and mechanisms involved in how we experience empathy.

At present, however, the discovery of mirror neurons does not seem to necessitate a revision of the current theoretical framework of the theory of interpretation, to take one of Lauer's examples. This brings us to our second objection, which concerns the scope of the grounding that the study of literature might be given in cognitive science or neuroscience.⁸ Lauer writes that »literature imitates human actions, as the tradition of poetics says together with Aristotle, and takes pleasure in doing so« (»Literatur ahmt Handlungen von Menschen nach, sagt die poetologische Tradition mit Aristoteles, und das mit Freude«, 153). Thus, Lauer's stated aim is »to link the concept of mimesis handed down by poetics with new insights about cognition and developmental psychology« (»den aus der poetischen Tradition entstammenden Begriff der Nachahmung mit den neueren entwicklungspsychologischen und kognitiven Einsichten zu verknüpfen«, 138). The ability to imitate is a phenomenon that has been returned to again and again in the history of poetics and literary theory; it must, as Lauer shows, be reconstrued as an anthropological foundation of sociality and culturality. Mimesis is and has been able to play such an important role in the arts because humans are »very good imitators« (»sehr gute Nachahmer«, 140). Only because we have control over the »imitation of other people within us« (»die Nachahmung des anderen in uns«, 143) are we able to experience »empathy« (»Empathie«, 142) with other people and, for example, with fictional characters. The presence of empathy in humans is an anthropological prerequisite for the reception of literary artefacts on the basis of empathy. Literature exploits an »empathy mechanism, the ability to feel the same feelings as other people« (»Empathie-Mechanismus, die Fähigkeit, dieselben Gefühle wie andere zu fühlen«, 154) in the form of our ability to imitate.

As a rule, the reception of literature depends on this fundamental human ability to empathize; from this Lauer concludes that any theory of interpretation has »therefore to presuppose an awareness of developmental psychology, evolutionary theory, and the cognitive sciences if it is to call itself scientific [*wissenschaftlich*]« (»daher die Erkenntnis der Entwicklungspsychologie, Evolutionstheorie und der Kognitionswissenschaften voraussetzen, will sie sich eine wissenschaftliche nen-

⁸ In certain circumstances, there could be a further problem of scope that we do not consider here: the level of generality of the explanations sought for in this context. In so far as empathy and imitation are anthropological dispositions, the very ones on which culturality and sociality depend, literary communication cannot but presuppose their existence in the first place. This, though, does not in itself tell us anything about the specific role of literature. Even if literature turned out to be a form of training in which the ability to empathize and the ability to imitate can be honed through play (i. e. motivated only by ludic pleasure and aesthetic desire), it would not be clear what distinguishes this kind of training from other kinds of training, art-related and otherwise, that are also based on empathy and supported by imitation. In short, even if the discovery of mirror neurons were to have implications for the foundations of culturality as a whole, Lauer's initial question – what is distinctive about (how we interact with) literature? – would present itself afresh, this time however from *inside* a theory of culture reformulated on the basis of knowledge obtained from work in cognitive science.

nen«, 157). Lauer then drives home the importance of this connection in the thesis he puts forward about the relationship between the study of literature and work in the human sciences: »The consequence of what has been said here is therefore that the study of literature becomes a science [*Wissenschaft*] only when it both takes the insights of work in the human sciences as its benchmark and exposes its hypotheses to empirical testing« (»Die Konsequenz aus dem hier Gesagten ist daher, dass die Literaturwissenschaft nur dann eine Wissenschaft wird, wenn sie sowohl die Einsichten der humanwissenschaftlichen Forschung als Standard aufnimmt wie auch ihre Hypothesen einer empirischen Prüfung aussetzt«, 158). Lauer argues persuasively that this ›consequence‹ has important implications for the empirical study of reception (157), but it does not necessarily have any such implications for a theory of interpretation. It begins to seem as though the theory of interpretation and the empirical study of reception have not been distinguished sufficiently here. Indeed, when cognitive psychology is used to analyse how aesthetic artefacts are understood, we often find a tendency to suggest that developing an empirical theory of reception also means developing a normative theory of interpretation (Gibbs 1999 and Pilkington 2000 are two examples of this tendency).

There are further advantages to distinguishing between (a) theories about the real-life process of understanding a linguistic utterance and (b) the (meta)theory of the disciplines that interpret signs or texts, which, as a normative theory of understanding, is concerned with the way in which a linguistic utterance that is already understood is inscribed in a particular academic discourse (Scholz 2005, 245). Clearly separating the two allows us to keep in mind important distinctions such as those between professional and non-professional ways of approaching literature, between *intelligere* (in the early stage of immediate understanding) and *interpretari* (in the later stage of understanding as an act of reflection), and between the facticity of the act of understanding and the norms in terms of which its results are validated. It may be felt that there is a danger of the results obtained from the empirical study of the non-specialist everyday reception of literary artefacts being transferred directly, in the manner of a ›fallacy of the uninitiated‹, to the professional interpretation of these artefacts by literary scholars (Danneberg 1995, 258). In so far as such a danger exists at all, it should be pointed out that probably the only context in which the insights of work in the human sciences can be exploited profitably is that of the empirical reconstruction of actual acts of reception (a not inconsiderable achievement).

Lauer is right to point out that »we look not inside other heads in order to understand other people, but inside ourselves« (»wir gucken nicht in andere Köpfe hinein, um andere zu verstehen, sondern in uns«, 153). Imitation as a way of understanding, however, must surely be dependent on the cultural resources that are available inside us in any given case. How, then, are we to understand the hearts or minds of the protagonists in a novel from an earlier period, say, if we can look only ›inside ourselves‹ but do not find there the concept of love that defines and guides those

protagonists? At this point, from the perspective of current methodological reflection in the study of literature, imitation presents itself as a process of analogy formation that may perhaps be necessary but cannot be straightforwardly described as an unproblematic mode of understanding (see Spoerhase 2007). Questions of this nature cannot be answered by an empirical approach to the study of reception on its own; instead, it is necessary to turn to the methodological theory of literary and cultural studies, where ›to understand‹ is a normatively charged achievement verb that as such denotes not only a psychological process but also an appraisal of a process of interpretation as having succeeded in terms of particular criteria. We would therefore be misinterpreting the difference between a hermeneutics understood in this way (i. e. one that differs fundamentally from the proposals in Gadamer's philosophy) and the empirical study of reception if we were simply to recast it as an opposition between ›aesthetic‹ and ›scientific‹ approaches. Instead, this hermeneutics differs from the empirical study of reception in that it sets up a normative ›regime of validity‹. Seen in this way, Lauer's call for the study of literature to be linked with research in the human sciences seems acceptable above all where the empirical study of reception is concerned.

Our discussion of knowledge transfers using the current discussion of mirror neurons in cultural studies as an example can be summarized as follows: at the present moment in time, this particular knowledge transfer does not offer insights that could be taken further in the study of literature. This is above all because the current state of knowledge in the source discipline has not yet reached a stage advanced enough to make the knowledge transfer appear legitimate. In addition, the categories involved in the findings of the source discipline are such that, at best, we can expect clarification of how processes of literary reception *actually* take place: the knowledge transfer has no bearing on the normative question of how texts *should* be treated in the context of the study of literature as an institutionalized and methodologically informed discipline.

2. Concluding Remarks on the Transfer of Knowledge

In describing our position above, we took as our example Lauer's proposals regarding the grounding of the study of literature in neuroscience and cognitive science. Our findings can now, we believe, be generalized so as to set out some fundamental points about the transfer of knowledge involved.⁹

1. It has been known since the literary theory (primarily poetics and rhetoric) of classical times that a variety of cognitive processes play a central role in the reception of literature.

⁹ Any potential resemblance these remarks may bear to axiomatic statements is due to the fact that their length has been kept to a minimum in the present context.

2. If current work in cognitive science makes it possible to increase our understanding of these processes in general terms, there is no fundamental reason why literary scholars should not make use of it in their efforts to obtain a better understanding of the role these processes play in the specific context of the reception of literature.
3. This transfer of knowledge can take place on various levels. It is, for example, conceivable that contemporary research in cognitive science could produce results suggesting that accepted accounts of the reception of literary texts based on poetics or rhetoric are misleading, or that the accepted terminological distinctions of literary theory are imprecise.
4. From this perspective, it is not convincing to suggest that we need to ascertain, as a matter of principle, whether or not the transfer of knowledge in question is helpful and beneficial to the study of literature. Instead, the answer to this question depends on separate subordinate issues, including (*a*) the current state of research in cognitive science, (*b*) the current state of research in the study of literature, (*c*) the category (or categories) to which any given problem relates, and (*d*) whether the transferred knowledge can be applied in individual contexts specific to the study of literature.
5. It follows from this stance that knowledge transfers can be appraised only in relation to (*a*) the state of research in the source discipline, (*b*) the state of research in the receiving discipline, (*c*) the category (or categories) involved, and (*d*) the context in which the transferred knowledge is to be applied in the receiving discipline. For all their brevity, these general methodological remarks should be clear as far as points (*a*) and (*b*) are concerned; further explanation may however be felt necessary in the case of (*c*) and (*d*).
6. The categories involved (*c*) in the problem under investigation have a major influence on the legitimacy of a knowledge transfer in so far as a transfer of knowledge is helpful only if it takes place on the level of the same category (or categories) as that involved in the problem under consideration. Since classical times, for example, people have been developing and discussing theories, some more ambitious than others, about the structure of artistic artefacts such as marble sculptures. In this particular case, recent work in solid-state physics means that it is now possible for us to understand the underlying atomic structure of marble far better than, say, Winckelmann (or one of his contemporaries who was familiar with physics) could have. Nonetheless, it would not be considered sensible to import the findings of present-day physics into the study of art, for the descriptions of aesthetic structures with which the art historian is concerned involve structural properties that are categorially entirely

different from those involved in the structural descriptions of the solid-state physicist (the former relate to macrostructure, the latter to microstructure).

7. Saying that transferred knowledge can be applied (*d*) in a particular context means that it must be possible to provide examples showing it is at least plausible that the ›borrowed‹ knowledge can be sensibly employed in the receiving discipline; these examples will involve the study of objects with which the receiving discipline is concerned.¹⁰ It should be mentioned in passing that this position could be taken further to produce a more demanding requirement. It would stipulate that the ›borrowed‹ knowledge should not only be employed in the receiving discipline but also yield results that would not have been readily obtainable there without the transferred knowledge. In this case, the legitimacy of a knowledge transfer would depend on whether or not it leads to innovation in the receiving discipline.

It has become clear that, where the current debate between Kelleter and Eibl is concerned, there is little to be gained from adopting a stance that is, as a matter of principle, for or against the transfer of knowledge (possibly across the board) from current research in cognitive science to research in the study of literature. It therefore seems equally misplaced to adopt a stance that means building (as it seems) paradigms in undisturbed isolation by supporting, as a matter of principle, the study of literature as cognitive science or neuroscience on the one hand, or the study of literature as a hermeneutic or philological pursuit on the other. It will always be necessary to determine on a case-by-case basis whether, and in what form, knowledge transfers are sensible by considering the (constantly changing) state of research, the problem at stake, and the category (or categories) involved. This may not be what we want to hear, but there is no way round it. And, in the end, all it means is that the rewarding debate on how the study of literature could best be linked to knowledge obtained in the human sciences will be with us for some time to come.

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¹⁰ Mellmann 2006 takes a significant step in this direction (see pp. 119–120 on mirror neurons).

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