A cognitive supplement to rhetorical theory: Potential benefits from investigating neuroscientific evidence

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1. Introduction

Recent years have seen the field of neuroscience develop with impressive haste. Indeed, it may now be interesting for theorists from other areas to investigate whether or not the knowledge obtained in neuroscientific experiments might inform the assumptions, theories and analyses in those areas. The article discusses methodological, technical and explanatory limitations of neuroscientific evidence in general (although some remarks concerning individual methods are presented as well) in order to investigate whether or not rhetorical theory may learn from neuroscientific evidence. The article takes neuroscience to be a specific empirical discipline. One of the main claims of the article is that presumably neuroscience is not more reductionistic than other empirical disciplines as long as the researchers conducting the experiments are aware of the methodological, technical and assumption limitations of the approach and that neuroscientific evidence is not over-extrapolated to cover concepts that are not warranted in the study. The complexity of the neuroscientific approach puts serious demands on readers (such as rhetorical theorists) since we will have understand the strengths and weaknesses of the methods used and the statistics employed in order to be able to evaluate whether or not a given neuroscientific experiment is of use to rhetorical theory and analysis (for a discussion on this topic within the field of experimental psychology, see Henson, 2005).

The rhetorical milieu has engaged in such discussions in recent years. Thus, Rhetoric Society Quarterly published a special issue on the topic November 2010 (Jack; Jack & Appelbaum; Jackson; Johnson; Pryal), and Daniel Gross (2006) argues that neuroscientific data may be too reductionist to be useful to rhetorical theory. The main aim of the chapter, then, is to discuss this issue and to investigate neuroscientific methodology and the implications with regard to limitations and potential benefits for rhetorical theory. This is briefly exemplified by exploring some illustrative data concerned with emotional appeals. However, the main aim remains to discuss whether or not neuroscience as an academic discipline may be of use to rhetorical theory and analysis.

The article falls in seven parts. Firstly, I will comment on the distinction between normative and descriptive approaches in order to appreciate that neuroscience primarily functions as a descriptive approach. Secondly, I will discuss the methodology and technology of neuroscience. Given the limitations of the article and the complexity of the methods and technology used in neuroscience, this presentation is indicative rather than exhaustive. Thirdly, objections to neuroscience are presented and discussed – in particular the worry that neuroscience posits culturally reductionistic studies, which are of little or no use to rhetorical theory. After discussing potential reductionism and basic assumptions, I move onto discussing the potential benefits from neuroscience. The article is concluded with a brief example of emotional appeals and some concluding remarks.
2. Normative and descriptive approaches

The distinction between normative and descriptive sciences is pivotal in the discussion concerning whether or not cognitive theories and neuroscience may contribute to rhetorical theory. Kahneman & Tversky (1984) defines the difference between the two:

“The normative analysis is concerned with the nature of rationality and the logic ... The descriptive analysis, in contrast, is concerned with people's beliefs and preferences as they are, not as they should be.” (p. 341)

The normative analysis is constructed from basic assumptions. As Kahneman and Tversky mention this might be a theory of for example rationality, logic, or maths, but the role of normative analysis extends into theories constructed from these basic assumptions such as rhetorical theory. Kock (1997, p. 15) notes that “rhetoric is an empirical and normative science concerned with the production and reception of utterances, considered in their entirety” (my translation, see also Kock, 2002; Jørgensen & Villadsen, 2009, chapter 1 and 3). That is, the normative element in rhetorical theory enables rhetorical theorists and analysts to evaluate whether a persuasive attempt falls within sound rhetorical practice – or in other words, rhetorical theory posits normative benchmarks against which it is possible to evaluate a rhetorical artefact in a given context. This stance towards rhetorical theory has notably lead to the development of rhetorical criticism (see e.g. Foss, 2004).

Compared with the normative approach, the descriptive approach offers analyses concerned with how people actually behave – either in experimental settings, by observation or investigation of statistical relevant information or similar methods. The purpose of this kind of investigation is to determine whether or not the normative assumptions and predictions hold true in a setting that resembles real life as closely as possible. As an example, Kahneman & Tversky (1984) investigate human beings and their actual approach to losses and gains. In doing that, they were able to question the basic assumptions of pure rationality that have been dominant in normative, economic theory. Whereas the normative predictions stem from these assumptions, the descriptive methods (in neuroscience) often rely on experiments to test these assumptions (amongst other experimental aims). That is, descriptive methods primarily rely on empirical data. However, no experiment can be created without basic assumptions since normative predictions are deduced from them. This means that if an experimental setting fails to show the results predicted by the normative theory, the assumptions may be questioned.

The two approaches are both important to the constructing, testing and revision of theories and analyses. Thus, normative theories inform theorists of the predictions/benchmarks against which the descriptive data should be measured. Experimental settings designed to collect descriptive data are informed by the same normative considerations in order to construct their experiments, evaluate statistical data and so forth. Normative approaches may then confer with the results of such descriptive data to re-evaluate and revise the basic assumptions that function as the theoretical framework for the normative theories. In other words, descriptive approaches rely on normative predictions, and normative approaches may revise theoretical predictions and analyses when faced with descriptive evidence. This, in turn, calls for revision of basic assumptions and further experiments.

That is, there is a constant theoretical back and forth between normative and descriptive approaches. Therefore, if we construe rhetorical theory primarily as a normative approach, we – as rhetoricians – should constantly look to descriptive data to ensure that our basic assumptions are as correct as possible. I claim that neuroscience (in
the same manner as other descriptive disciplines) may offer empirical evidence that rhetorical theory and analysis may benefit from investigating. If we accept this general claim, for the purpose of the present article we are left with two central questions: 1) what are the strengths and weaknesses of neuroscientific methodology and data and 2) what are the potential theoretical and analytical benefits that may be gained from inspection of neuroscientific data?

3. Neuroscience: Methodology and technology

In order to assess the potential benefits and pit-falls of neuroscience as a supplement to rhetorical theory, it is necessary to know the methodological and technical background of the various techniques used to provide empirical evidence. Naturally, the methods are complex and differ substantially across the discipline. Consequently, I will limit this presentation of methodology and technology to some fundamental issues (for more detailed information on the various methods and technological issues, see Ward, 2006).

Neuroscientific research generally falls within two general lines of data collection: lesion/behavioral studies and brain scans. The methods describe temporal resolutions (when a cognitive event occurs) and spatial resolutions (where a cognitive event occurs). It is evident that neuroscientific work involves a number of ethical issues, but I will not touch upon these in this article.

In neurosciences, the behavioral data come from two main sources: lesions studies and transcranial magnetic stimulation (TMS). Lesion studies examine patients with neural damage “…in which one attempts to infer the function of a component (or region) by observing what the rest of the cognitive system can and can’t do when that component (or region) is removed” (Ward, 2006, p. 79). That is, subjects are given tasks and the deficiencies caused by the lesion gives tentative indications concerning the regions involved in the given cognitive task. Lesion studies have consequently benefited from the development of imaging techniques since this makes precise lesions location possible. Comparable with lesions studies, TMS is said to induce “virtual lesions” that are brief, controlled and reversible. TMS makes use of electromagnetic induction that is centred on an area covering roughly 1 cm². The electric currents stimulate the neurons at the targeted area due to the fact that “If these neurons are involved in performing a critical cognitive function then stimulating them artificially will disrupt that function” (Ward, 2006, p. 93). That is, if I perform the cognitive function of speaking, disrupting that function will cause me to have trouble speaking. Thus, TMS may be used to investigate lesions behaviourally in a controlled and non-invasive manner. The TMS setting differs significantly from natural lesions in their reversibility and controllability, whereas natural lesions may unearth unexpected patterns that may inform future research. In other words, TMS cannot replace natural lesion studies, but should be seen as supplementary to these.

The most prevalent scan or measuring methods used in neuroscience are functional magnetic resonance imaging (fMRI), positron emission tomography (PET) and electroencephalographical event related potential (EEG/ERP). Quite naturally, each method investigates different aspects of the responses in the brain – both in terms of what they measure, at what physical level they measure and how fast they measure. Both fMRI and PET are functional imaging methods and thus both rest on the assumption that when investigating a region of the brain “…neural activity produces local physiological changes in that region of the brain. This can be used to produce dynamic maps of moment-to-moment activity of the brain when engaged in cognitive tasks” (Ward, p. 49). In order to use PET, it is necessary to inject a radioactive tracer into the bloodstream.
around the head measure brain activity. The fMRI scan, on the other hand, measures a blood-oxygen level dependent in functional tasks. These scans, in general, have spatial benefits.

Lastly, EEG/ERP is a frequently used method in neuroscience. Compared to the imaging methods (fMRI and PET), which has good spatial resolution, but low temporal resolution, EEG/ERP is a temporal method. The method records electric signals via electrodes placed at numerous places on the scalp. The aim of these recordings is to gain insight into the temporal relationship of brain activation. For the EEG to give a reading, it requires that a cluster of neurons is active in synchrony. Otherwise, the signal will be too weak. Therefore, the area of interest is contrasted with areas that are assumed not to be involved with the particular task. Thus, EEG/ERP measures the timing and peaks of electrophysical changes “…elicited by particular stimuli and cognitive tasks” (Ward, 2006, p. 38).

Common to these methods is that they are non-invasive. That is, the researcher does not need to operate in the brain or open the skull in order to conduct the experiments. Compared with this, one of the most precise measurements, single-cell recording, is invasive and very rarely performed on humans (I only know of Mukamel et al., 2010, see also Glenberg et al., 2010). One of the most important aspects of these various methods and their respective limitations (e.g. EEG/ERP has poor spatial resolution, fMRI has poor temporal resolution and so on) is the type of theoretical predictions and consequences that may be extrapolated from each respective method. Furthermore, they measure different aspects of brain activation. Where PET and fMRI measure “downstream consequences of neural activity (i.e. changes in blood flow/oxygen to meet metabolic needs)” (Ward, 2006, p. 53), EEG/ERP measure the electrical charge created by the neurons themselves.

In general, none of these methods may point towards definite conclusions on their own. Rather, neuroscientific evidence often stem from a particular task being investigated with the different methods to see if they converge. In general, modern neuroscience acknowledges individual methodological limitations, carefully considers the conclusion drawn from the data, and bears in mind the potentially reductionistic pit-falls in order to differentiate itself methodologically, technically and in terms of scope and aims from classic phrenology (e.g. Friston, 2002; Horwitz et al., 1999). I will touch upon this subject in the following section.

4. Objections to Cognitive Theories

One might rightly object to the use of laboratory and experimental work in arts and humanities due to fears of reductionism. Indeed, several scholars have noted this risk. Within social psychology, Babbie (1975) notes that ”The greatest weakness of laboratory experiments lies in the artificiality. Social processes observed to occur within a laboratory setting might not necessarily occur within more natural social settings” (p. 254). The main scepticism towards experimental data derived from a laboratory in general and neuroscientific evidence in particular may be summed up in the following three critical points. First and foremost, the potential reductionism is a viable point of criticism. This is applicable to experimental data gathered from a laboratory in general. Secondly, the

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technical and methodological limitations of neuroscience are important to consider. Last but not least, it may be questioned how the conclusions from the data collected are extrapolated into theories of human behavior and cognition.

One of the most pressing objections to neuroscience as a supplement is the potential risk of over-simplified experiments omitting cultural e.g. variables\(^2\). Indeed, given the fact that persuasive communication always takes place in a social, contextual setting, omitting these variables from the experiments, make scepticism towards the findings important. In his interesting book, Gross (2006) voices this concern when he argues that

“...subjective experiences such as emotion have an essential social component an are best treated with social analysis of the sort developed in the rhetorical tradition, not scientific analysis that must reduce social phenomena in certain critical ways so as to function properly as science” (p. 33-34).

This is a very valid point of criticism. Neuroscientists must indeed consider and deal with these challenges when creating and analysing experiments, and rhetorical theorists will have to bear the potential reductionism in mind when reading neuroscientific studies. However, Gross suggests an interesting dichotomy since the basis of the claim cited above seems to rest on the assumption that emotions (and by power of extrapolation: other concepts important to rhetorical theory as well) are best investigated by traditional, rhetorical social analysis instead of scientific analysis. This assumption indicates that arts and humanities have no potential use of the scientific analysis. Gross further remarks that

“I will concede that it is trivially true and therefore uninteresting to assert that everything human, including the judgment of trustworthiness, has some localizable and theoretically measurable manifestation in the body or the brain” (p. 34)

The reductionism criticism against the use of neuroscience can thus be formulated into two separate claims. One, scientific analysis is over-simplifying the experiments and two, the data gathered from neuroscience are trivially true and thus uninteresting. Concerning the first claim, I will point towards the previous section concerned with empirical and assumption reductionism. Concerning the second claim against neuroscience, I argue that conclusions drawn in neuroscientific research do not posit the claim that the brain is involved in cognition – instead a neuroscientific aim is to investigate how the brain is involved, i.e. localization, speed etc. In the same manner, it is trivially true that persuasive attempts exist in contextual and cultural relationships – however, this does not render the investigation of these concepts, their functional relationships and so on uninteresting. Rather, it is of great interest to discuss how these concepts work in the same way that it is very interesting to discuss how the brain functions, not that it functions.

A response to the kind of scepticism towards neuroscience (and indeed any empirical science) concerning the potential reductionism may revolve around a general remark concerning theory and analysis construction. As I will discuss later in the chapter, it seems that no theoretical foundation – scientific or cultural – can avoid some form of reductionism, assumption leaps of faith etc. Rather, as researchers we have to acknowledge the limitations of various approaches in order to understand the potential contribution from the respective fields. Indeed, we have to remain sceptical towards empirical data. But scepticism does not entail blatant rejection. Instead, we should look towards empirical sciences (including neuroscience) and investigate what these findings tell us of how the brain functions and use these if they are applicable to rhetorical theory and analysis.

\(^2\) For instance, a study was conducted investigating Japanese subjects’ reaction to linguistic connotations. The findings were not in line with the findings conducted in European subjects, indicating cultural differences (see Niki, 2010).
In addition to the pitfall of over-simplification, there are technical and methodological limitations to each of the methods presented in the above. As briefly presented in the section concerned with the methodology and technology of neuroscience, there is a significant difference in what the methods measure and how these measurements are acquired. Thus, some methods have poor spatial resolution (such as the EEG/ERP) whilst others have less good temporal resolution (such as PET). This means, that we cannot get any clear indication from individual experimental data without realising the shortcomings of the method in question. Indeed, this is in some ways tied together with the aforementioned potential reductionism that neuroscientific research faces since the methods and technologies used in experiments puts a limiting strain on the experiment given the fact that the individual methods on their own cannot account for all that is neurologically interesting. Note, however, that this is a significantly different type of reductionism than the one described previously, since this is not concerned with the general use and applicability of neuroscience as a discipline. Rather, this potential reductionism (or rather: limitation) is caused be technological and methodological strains. The most prudent circumvention of this limitation is twofold. Firstly, the experiments should be replicable (indeed, this goes for any empirical data) and secondly, a clearer and stronger picture is gained by investigating the same phenomenon with a multitude of methods. In other words, to gain a stronger neuroscientific indication of activity and connectivity it is necessary to make use of the various methods available.

Lastly, it is important to consider how the explanatory conclusions are drawn from the collected neuroscientific data. In order to posit indications drawn from neuroscientific evidence such as the methods presented previously, it is essential to consider what the neural activity means in terms of human cognitive activity. Thus, it is generally assumed that neural activity picked up by measurements indicates that the active area is involved with the particular cognitive task. Thus, if superior temporal sulcus (STS) activates in language tasks, it is assumed that STS is involved in the process of perceiving and producing linguistic content (see e.g. Scott et al., 2000, 2009; Avad et al., 2007). However, the limit to which what kind of conclusions can be drawn from the data may be questioned (see e.g. Sidtis, 2006). That is, it seems theoretically viable to consider whether activation is a sign that a particular area may be involved in carrying out the task or if the areas are activated due to the possibility that they are struggling when faced with the particular tasks. Methods such as TMS may help to alleviate this kind of questions by behaviourally investigating the particular tasks.

As another example of possible questionable conclusions, a researcher might hypothesize that adding a cognitive task simply activates additional areas connected with the task in question. Then, the researcher simply subtracts the previously observed activation with the new activation and recovers the neural areas involved with the cognitive task. This is the approach known as cognitive subtraction. There are however, some basic problems with the approach (see e.g. Friston et al., 1996; Ward, 2006, pp. 57-64). For instance, “… the addition of an extra component in the task has the potential to change the operations of other components in the task” (Ward, 2006, p. 58). That is, there may be an interaction effect. Therefore, simply adding a cognitive task is not directly translatable to the addition of new active areas in any clear manner. It is mandatory that neuroscientific researchers control for these potentially fallacious conclusions drawn from cognitive subtraction, and when reading experimental reports, rhetorical theorists should consider whether or not the conclusions and indications drawn from the neuroscientific data are warranted and probable. Otherwise, we run the risk of the empirical fallacy as described in the following section.
These are three notable objections to the possible limitations of experimental data derived from laboratory settings. However, we may still gain interesting insights into the workings of the human mind by investigating experimental data as a *supplement* to traditional social analysis such as the analyses developed in the rhetorical tradition. That is, with a proper understanding of the neuroscientific methodological and technical limitations, we may appreciate the findings for what they are without over-extrapolation and with consideration of the importance of cultural influences. However, before discussing the potential benefits of investigating neuroscientific evidence from a rhetorical point of view, I will consider reductionism more carefully.

5. Empirical and assumption reductionism

The most serious claim against the use of neuroscience as a supplement for rhetorical theory and analysis is that it potentially reduces the complexity of social situations in order to fit them into an experimental setting and further reduces these findings by ad hoc investigation of neural peaks, which may not necessarily lead to valid conclusions. Indeed, reductionism is not only a possible fallacy of neuroscience: this is a possible fallacy of any empirically based science.

*Empirical fallacy.* I label the empirical fallacy that of extrapolating experimental evidence to areas that are not specifically covered and controlled for in the actual experiment. Thus, discovering the code-like bee communication in the form of various dances or collective decision-making (e.g. Gould, 1974; Passino et al., 2008) or other animal communication like, does not entail code-like, stimuli-response communication in human beings (Dawkins & Krebs, 1978 & Krebs & Dawkins, 1984). That is, we might *speculate* about the larger ramifications of the observed and collected experimental data, but it should *never* be considered more than speculation. The investigation of empirical data, quite simply, does not warrant more (for a discussion on experimental methodology, see e.g. Howitt & Cramer, 2005; Rasmussen et al., 2006). The potential pit-falls of over-extrapolation of observed data, over-simplification of the experimental setting and the omittance of subtle variables such as cultural values remain a constant *challenge* to researchers within the field of neuroscience. But as long as researchers and readers of scientific data understand these limitations, the distinction between experimentally warranted conclusions/indications and speculation should be clear. Another less obvious fallacy is the assumption fallacy. This is more difficult to observe, but no less reductionist if not treated carefully.

*Assumption fallacy.* Assumption fallacy is over-confidence in normatively and deductively derived theorems resting on basic assumptions. An example of this type of fallacy is the confidence in pure rationality assumed by philosophers in argumentation theories and economists in classical economy (e.g. Neumann & Morgenstern, 1953). Recent studies (e.g. Thaler, 1980; Kahneman & Tversky, 1984; Stewart et al., 2006; Hahn & Oaksford, 2007) have questioned the basic assumption of rationality and consequently the very foundation of the theories constructed from these. That is, these thinkers believe some basic assumptions to be true and construct theories accordingly *from* these relying on the perceived truth of the assumptions. This fallacy operates behind the theories, so-to-speak. This makes it more difficult to detect, but no less fallacious. The assumption fallacy, then, is the over-confidence and subsequent over-extrapolation of the validity of the constructed theories derived from basic assumptions.

In order to circumvent the most ostensible assumption fallacy, researchers should confer with data gathered from empirical evidence and continuously discuss and revise
these assumptions. Conversely, to manage the empirical fallacy, it is pivotal to consider the basic assumptions that the experiment relies upon as well as the subtler variables that might not be incorporated into the experiment. In other words, to control for the empirical and assumption fallacies, we need to move between normative and descriptive disciplines to constantly update our basic assumptions, theoretical predictions, analytical tools and experimental settings.

6. Potential benefits from cognitive sciences and neuroscience

Keeping the aforementioned methodological, technical and assumption limitations close in mind, rhetorical theory might gain potential benefits from investigation of neuroscientific evidence in four main areas: assumption testability, theoretical predictions, analyses and as inspiration for future research. I will limit these discussions to brief general remarks since I attempt to exemplify the potential benefits in an example concerned with the case of emotional appeals.

Assumption testability. The descriptive approach aims to provide evidence either in support or against the basic assumptions, whereas the normative approach uses the assumptions to posit theoretical predictions and construct analytical tools. As a descriptive, empirical science, then, neuroscience may inform us about elements of the basic assumptions – in other words, neuroscience may inform normative researchers with elements concerning the foundation of theory and analytical constructions.

Along this line, I will posit a potential meta-theoretical distinction between theories and analyses on a macro and a micro level. By macro, I mean the cultural and interpersonal phenomena as well as philosophical considerations concerning the moral acceptability of cultural phenomena. By micro, I mean basic features of human capability such as speed of reaction/understanding, valence of reactions and so forth. On the face level, neuroscience is concerned with micro issues. In other words, the indications drawn from neuroscientific data should not be confused with cultural theories. Rather, often neuroscience is concerned with localization, temporal issues and so forth. i.e. relevant for basic assumptions on a micro level.

Theoretical predictions. Whenever basic assumptions are revised, it follows as a natural consequence that theory and theoretical predictions are revised as well due to the internal set-up of normative approaches. For example, as empirical data challenged the assumptions of pure rationality, the theories derived from these assumptions were challenged as well. In other words, amongst other theories the empirical findings have sparked prospect theory (Kahneman & Tversky, 1984) and Decision-by-Sampling (Stewart et al., 2006), which have revised the basic assumptions posited in traditional economy and decision-making. Could neuroscience in the same manner challenge, develop or enrich assumptions in rhetorical theory?

Analytical benefits. In the same way that theories are influenced by the revision of assumptions, so should analytical tools be influenced by assumption revision. As an example, if neuroscientific evidence indicates audience differences in the speed of recognition, it may influence the theoretical predictions of audience reactions to a particular appeal, which in turn will influence the potential analysis of a given rhetorical artefact. In general, theory and analysis will be influenced by any and all assumption revision on a micro-level and consequently should be informed by the investigations conducted in neuroscience.

Inspiration for future research. The last remark is concerned with inspiration for future research since neuroscientific evidence might provoke or inspire the readers of the
7. Concluding remarks

Neuroscientific evidence is – at least on the face level – not more reductionistic than other empirical data. Consequently, it should not be looked at with more suspicious eyes than any other empirical evidence. This is not to say that we should conform to any and all neuroscientific evidence. Rather, due to the potential limitations and general empirical reductionism, we should always be extremely careful in our reading of these experiments and their methodology sections. Furthermore, we should not how the researchers extrapolate their data and whether or not the conclusions are warranted by the experiments. This requires, however, that the rhetorical theorist is highly trained in methodological, technical and analytical issues concerning neuroscience. Otherwise, it becomes impossible for the rhetorical theorist to evaluate the potential contribution and pitfalls of a given study.

The various techniques posit different investigative benefits and limitations. Thus, some methods are well equipped to explore the spatial resolution of a particular task, whereas other methods are better at exploring temporal relationships. It is vital that rhetorical theorists understand and appreciate these methodological benefits and limitations in order to gain any form of insight into neuroscientific studies. Furthermore, the conclusions drawn from the data may be questioned and investigated in the same way that any empirical data should be revisited. This is reflected in the constant back and forth between normative and descriptive approaches: neither of the approaches can theoretically stand by themselves. They should always confer with the other and revisit the concepts and experiments used. Otherwise, researchers run the risk of committing either the empirical or the assumption fallacy.

When neuroscience is appreciated as an empirical discipline in the same way as other empirical sciences, we may then turn towards the potential benefits from neuroscience. The major potential contribution is concerned with the investigation of the basic assumptions that are used to posit theoretical and analytical predictions in normative approaches. That is, neuroscience may shed some light on the assumptions that revises our expectations and consequently revises both theory and analysis. The very brief investigation of neuroscientific evidence concerning emotional appeals indicates this potential benefit. In this investigation, we see that neuroscience posits theories of behavior stemming from mirror-like systems. That is, when a person hears another person laugh, she will by instinct invoke some of the same pre-motor cortex that she would use to smile. Or in other words, a smile is contagious. This is well known intuitively, but neuroscientific evidence thus supports the intuition and further supplements this by positing speed of recognition, valence and other interesting aspects of emotional appeals. Thus, a more complex image of emotional appeals appear that may be taken as a supplement to more traditional, cultural approaches since these micro-level mechanisms inform macro-level questions and vice versa.

In sum, by supplementing the traditional rhetorical approach with neuroscientific evidence, we gain at least three benefits. First and foremost, it (and other empirical sciences) provides ample opportunity to test the basic assumptions we posit in order to create our theories of the means of persuasion. Given the fact that these assumptions are
the foundation for the creation of rhetorical theory and analysis, we secondly get the possibility of revisiting our theoretical predictions and analyses by modification of the basic assumptions. By adopting this theoretical position of going back and forth between normative and descriptive theories and analyses, we reduce the risk of the empirical and assumption fallacies since the experimental work is kept in check by normative predictions and the basic assumptions are constantly challenged and revised by findings in descriptive explorations. Lastly, neuroscience may spark interesting inspiration in researchers from the classical rhetorical tradition. In conclusion, then, the field of rhetoric may well benefit from neuroscience as long as we recognize the methodological and technical limitations of the experiments and understand the potential conclusions drawn from the data. Crucially, without this understanding of neuroscientific method and technology we are unable to pass judgement on the discipline.

8. Appendix: A brief example of emotional appeals and mirror-neuron systems

Alongside the general argument that I have outlined in the chapter, a theoretical claim is best served by example. In keeping with this, I want to exemplify the potential benefits for rhetorical theory and analysis by investigating neuroscientific evidence concerning emotional appeals\(^3\). Indeed, emotional appeals are central to rhetorical theory and as it is well known have been so since Aristotle’s treatise on the subject. The discussion may thus be seen as pars pro toto for the general claim that rhetorical theorists might benefit from neuroscientific evidence. Due to lack of space, I will merely focus on some main findings without discussing the evidence in-depth. The possibility of investigating a cognitive basis for emotional cues in a persuasive setting as a supplement to traditional rhetorical theory and analysis is explored more in-depth in Madsen (in prep.). In the investigation, I will focus on how a rhetoric of emotions might develop the basic assumptions from this kind of empirical data. As mentioned previously, at the face level the primary benefit from investigating neuroscientific evidence rests on the potential revision of micro-level assumptions. Figure 1 illustrates this by exemplifying issues on macro and micro-level\(^4\).

Alongside illustrating the theoretical distinction between micro and macro-level questions, the double-headed arrow in the middle illustrates the back and forth between the levels. Thus, macro-level questions concerning emotional appeals should confer with micro-level assumptions in the same way that micro-level investigations (such as neuroscientific research) should look to macro-level issues such as culture theory.

Insert Fig. 1 around here (Examples of micro and macro elements)

Some of the immediate benefits from neuroscientific and behavioral evidence concerning emotional appeals may be the success rate of recognition and the theory of mirror neuron systems (MNS, see e.g. Rizzolatti & Craighero, 2004; Iacoboni & Dapretto, 2006) – the latter being the most important contribution in terms of rhetorical theory.

Spoken emotional appeals are complex stimuli relying amongst other things on facial interpretations (e.g. Ekman, 2003), neural word-processing (e.g. Wise et al., 2000)

\(^3\) In this investigation I will solely focus on the short inflamed emotional appeal, i.e. pathos rather than pathos and ethos. This is because the inflamed emotional appeal is easier to trace and replicate in experimental settings whereas there has not been conducted neuroscientific experiments on the subtler ethos appeal.

\(^4\) Quite naturally, the illustration is rather crude and is to be taken as an example. I do in no way intend the categories mentioned in the categories to be understood as exhaustive.
and pragmatic inferences (e.g. Carston, 2002). Nonetheless, there is substantial evidence to support the fact that human beings are very good at picking up emotional cues. Recognition rates have been above chance level for both positive and negative cues across cultures as well as culturally encapsulated (e.g. Banse & Scherer, 1996; Scherer et al., 2001; Sauter & Scott, 2007; Sauter et al., forthcoming). That is, speakers may rely on the fact that the audience are very apt at picking up their emotional cues in a persuasive setting. The behavioral evidence supports this.

Neuroscientifically, emotional cues are shown to activate several areas of the brain such as the amygdala (Scott et al., 1997), left middle temporal gyrus, right anterior insula (Morris et al., 1999), pre-motor cortex (Scott et al., 2009) and bilateral superior temporal sulcus (Scott et al., forthcoming). This is in line with the claim that emotional appeals are complex stimuli. I will focus on the pre-motor cortex activation since this area is of interest when concerned with mirror-like systems - MNS (in general, see Rizzolatti & Craighero, 2004 and Iacobini & Dapretto, 2006). In general, MNS in monkeys are defined as being “…discharged both when the monkey does a particular action and when it observes another individual (human or monkey) doing a similar action [i.e. the monkey does not do the action when observing]” (Rizzolatti & Craighero, 2004). That is, the same neuroanatomical structures are activated when performing and as when observing a particular type of action. This is argued to form a basis for emulating action5. An fMRI and EMG study by Warren et al. (2006) indicates that “passive perception of nonverbal emotional vocalizations automatically modulates neural activity in a network of premotor cortical regions involved in the control of facial movement”. Thus, if we encounter laughter, we are prone to smile. Wicker et al. (2003), Arnott et al. (2009) and Scott et al. (2009) report similar kind of mirror response with disgust, yawning and laughter.

Thus, neuroscientific evidence points towards a theory of physical emulation to some degree. This experience by emulation may then be hypothesized as a basic assumption for the persuasive potential of emotional cues. That is, the mirror-like activation in human beings may then be extrapolated to a theory of emotional appeals that include empathy by emulation and experience by emulation. Furthermore, if we may detect these mechanisms in human beings, it is possible to record response time, connectivity and so on. These response recordings may in turn inform rhetorical analysis by indicating how fast and reliable we may assume pathos to be in an audience. Even more interesting, it opens up for the possibility of investigating effects stemming from pathos appeals neuroscientifically. This line of research, however, requires a more complex understanding of the neural responses to emotional appeals and may as such be an interesting area of interdisciplinary research between the field of rhetoric and neuroscience. Rhetorical theory as a normative approach may inform neuroscientific experiments by positing predictions for emotional stimuli whereas these predictions may then be tested empirically to see whether or not the basic assumptions are realistic. In sum, it seems that rhetorical theory may benefit in re the basic assumptions, theoretically and analytically from investigating neuroscientific evidence concerning emotional appeals both in terms of studies already available and in terms of interesting potential research. To what extent this may be developed will be determined by future research.

9. References

5 In the neuroscientific literature it is still debated how translatable this data is to humans. Nonetheless, the studies conducted on humans strongly indicate a mirror-neuron type of system.


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