

Synopsis

It is a common research practice in the cognitive sciences to explain concepts applied to complex communicative behaviors (i.e., intentional communication, arbitrary meaning) by reference to the cognitive complexity that is required for the behavior to occur. This leads to communicative behavior often being described in cognitively loaded ways, i.e., requiring high-level cognition such as meta-representations. These cognitively loaded requirements in turn lead to the conclusion that a number of behaviors are exclusively displayable by humans, given that the cognitive requirements are too demanding to be displayed by nonhuman animals. The aim of the project is to suggest that a major issue with this common procedure is the lack of justification for some of the cognitively loaded descriptions of communication. Concepts such as intentional communication may require far less complexity even for the human case, as some empirical research suggests. The use of solely cognitive mechanisms as explanatory tools is based on the fact that research on these concepts originated in research, whose objective it is to find the underlying cognitive processes. That though does not imply that it is only cognitive elements that are involved in the displayed behavior. Research accumulating data on other primates and young children suggest that other mechanisms may be involved. This leads to debates surrounding questions on whether animals display concepts such as intentional communication to not make progress: two positions, one insisting on the cognitive complex description and the second position insisting on empirical studies having falsified position one, are opposing each other, with no common ground in sight. The project therefore proposes a change of focus, in order to re-evolve these discussions, posing the question whether affective states and the so-called Affective Social Learning framework represent an additional source for explaining a behavior's occurrence.

Keywords: Vergleichende Kognitionswissenschaften, social learning, affective states, conceptual engineering, cognitive mechanisms, Tierkommunikation

1. Aim of the research project/main research questions

It is a common research practice in the cognitive sciences to explain concepts applied to complex communicative behaviors (i.e., intentional communication, imitation learning, proliferation of language conventions) by reference to the cognitive complexity that is required for the behavior to occur. Because from that perspective cognition is the only tool for explaining its occurrence, this leads to communicative behavior being described in cognitively loaded ways, i.e., requiring high-level cognition such as meta-representations and mindreading. These cognitively loaded requirements in turn lead to the conclusion that a number of behaviors are exclusively displayable by humans, given that the cognitive requirements are too demanding to be displayed by nonhuman animals. The aim of this project is to suggest that a major issue with this common procedure is the lack of justification for some of the cognitively loaded descriptions of communication. Concepts such as imitation learning or intentional communication may require far less complexity even for the human case, as empirical research suggests (e.g., Szufnarowska, J. et al. 2014). The use of solely cognitive mechanisms as descriptive and explanatory tools is based on the fact that research on these concepts originated in the cognitive sciences, whose research objective it is to find the underlying cognitive processes. That though does not imply that it is only cognitive elements that are involved in the displayed behavior. Research accumulating data on other primates and young children in fact suggest that other mechanisms may be involved. This disagreement on the mechanisms and cognition involved leads to debates surrounding questions on whether nonhuman animals display the concepts to not make progress: two positions, one insisting on the cognitive complex description by referring to what I label **the common research stance** (see below) and the second position insisting on empirical studies having falsified position one, are opposing each other, with no common ground in sight. That is, retaining cognitively demanding concepts on the one hand without acknowledging diverging empirical evidence and on the other hand insisting on a simplification of cognitive requirements without offering a detailed methodological description of how and why the new conflicting findings fit into a definition of a concept, hinders any positive research conclusion.

The common research stance:

Given that the theoretical description of the concept in question is cognitively high-level and that empirical research has extensively shown that nonhuman animals cannot display the required high-level cognition, the concept cannot be applied to nonhuman animal species. Hence linked behaviors cannot be found in these species, independently of novel empirical descriptions of behaviors in other species that appear closely related to the human cognitively complex behavior. The reason being that the mechanisms at work defining the concept cannot be the same, see the current theoretical description of the concept.

The lack of progress in these discussions is problematic, given that results impact narratives on the evolution of human capacities, such as the evolution of language, and are often used as a premise in discussions concerning animal rights and welfare assessments for particular species.

The project therefore is supposed to propose a paradigm change, in order to re-evoke these discussions, posing the question whether affective states and processes represent an additional and valuable source for explaining a behavior's occurrence. During the course of the project, affective states will be introduced: It will be investigated, whether these lower the cognitive requirements necessary for the behaviors and allow, firstly, to dismiss the common research stance laid out above and secondly, to re-assess, whether concepts and behavior such as intentional communication and imitation learning may or may not be present in nonhuman animals, but also in non-verbal human infants. The project will investigate these questions with the help of two methods on re-assessing concepts, conceptual engineering (i.e., re-assessing concepts in order to improve them for a particular purpose) and the calibration method (i.e., re-assess concepts in accordance with, up-to-date empirical findings).

The following questions will be investigated:

Will introducing affective states to the concepts' explanation ameliorate the concepts?

What follows from that? Will the concepts in their new description allow for a re-evaluation on whether other species are capable of displaying behavior falling under these concepts?

This may be the case, if the deficiencies of the concepts can be described as tendentious towards cognitive heavy explanations:

Exp 1.: Contrary to what is often claimed, young children, when participating in intentional communication, appear to not focus, on intentions of communicators when the later produce ostensive signals that are

treated as indicators for those intentions. Rather young children appear to use the speaker's ostensive signals simply as non-mental, perceptual cues (see Szufnarowska et al. 2014, replicated by Gredebäck et al. 2018).; And Exp. 2: Chimpanzees are generally perceived as not having an arbitrary signal system, even though, firstly, there appears to be learning in the acquisition of signals (e.g., Laporte & Zuberbühler 2011) and flexibility with regard to signal use in specific contexts involved (e.g., Boesch 1995, different communities use the same signals differently). Secondly, a theoretical argument can be made for the case of arbitrary signals in great apes (see Sievers & Gruber 2020): Given the less complex signal systems of nonhuman primates compared to human language, the learning of arbitrary signals may require less complex cognition in place for great apes.

2. Central literature and current state of research relevant to the project proposal:

As laid out above, the main reason why the project suggests that concepts require re-assessment is based on the fact that conflicting empirical data lead to **debates** between two positions (i.e., researchers utilizing the common research stance vs. researchers claiming that empirical data shows otherwise), not allowing for any progress with regards to ongoing research questions on nonhuman animal capacities. The discussions are:

- i) The discussion surrounding intentional communication in nonhuman animals (see Moore 2016, 2017 vs. Scott-Phillips 2015a, 2015b; Sievers et al. 2017; Tomasello 2008 & 2014; Townsend et al. 2017)
- ii) The discussion around the presence of imitation learning in nonhuman animals (see Gruber 2016; Gruber & Sievers 2019; Tennie et al. 2009 & 2012; Tomasello 2008 & 2014; Whiten et al., 2009)
- iii) The discussion around arbitrary meaning in nonhuman primate communication (see Moore 2013; Scott-Phillips 2015b; Seyfarth et al. 1980; Sievers & Gruber 2020; Tomasello 2008)
- iv) The discussion surrounding referential signals in human and nonhuman animals (Sievers & Gruber 2016; Wheeler & Fischer 2012; Scarantino & Clay 2015)

This does not imply that the result of the conceptual re-assessment will lead to generally positive affirmations towards the presence of these concepts and capacities in nonhuman animals. What the re-assessment aims to accomplish is moving the discussions (i) – (iv) forward, by taking a look at potential deficiencies of the concepts, and how these could be improved. The improved concepts then may contribute to moving these discussions toward agreement.

For i) Cognitive requirements for intentional communication

Humans constantly engage in intentional communication. The study of communication therefore started out as an endeavor to describe characteristics of human intentional communication, which Grice (1957) characterized as *ostensive* on the production side, and *inferential* on the comprehension side. From a cognitive perspective, ostensive signaling implies that human signalers *openly* communicate their intentions to inform the receiver by not just producing sentences but also by using visual signals, such as gestures and facial expressions (i.e., so-called ostensive signals), to make it salient to the receiver that the signaler indeed has the intention to inform about x (Sperber & Wilson, 1986). Therefore, ostensive signal production and comprehension, at least in the traditional interpretation (Scott-Phillips 2016), requires metacognition.. All these requirements add up to a level of cognitive processing required that may not even be displayable by human children (Szufnarowska et al. 2014).

Studies on potential intentional communication in nonhuman animals have provided evidence for its presence (i.e., Townsend et al. 2018 primarily for great apes, Bourjade et al. 2014 for baboons, Pika & Bugnyar 2011 for corvids and for canids Mazzini et al. 2013; Gaunet & Deputte 2011, Vail et al. 2013 in fish).

For ii) Cognitive requirements for complex social learning and teaching related to communicative signals

It is claimed that humans display a particular kind of social learning for elements of human culture such as gaining knowledge about language use: so-called imitation learning (Gergely & Csibra 2013).

It is stated that human children are displaying imitation learning (e.g., Whitehurst & Vasta, 1975) defined as the “reproduction of both behavior and its intended result” (Boesch & Tomasello, 1998, p. 599) in order to learn cognitively opaque knowledge, i.e., not fully comprehensible knowledge by a learner just through

observation. the acquisition of novel words and their uses is one such example (i.e. the acquisition of language conventions). Imitators copy and reproduce both the mental state and the behavior of the demonstrator. Researchers disagree over what imitation learning amounts to on a cognitive level, with Tomasello and colleagues assuming imitation to involve inferring the knower's precise intentions (e.g. Tennie et al., 2009), which amounts to mindreading capacities and metarepresentation (e.g. I know that you intend to achieve x by doing y.) Furthermore, imitation alone is not considered sufficient for learning arbitrary words' uses (Csibra & Gergely 2009), given human language's complexity. Therefore, it is claimed that natural pedagogy-like teaching triggers the necessary learning process (Tomasello, 2003, 2008).

The concept of natural pedagogy is defined by Gergely and Csibra as referring "to instances of ostensive communication that promotes the learning of generic knowledge by the addressee" (Gergely & Csibra, 2013, p. 127). Parents for instance communicate ostensively and intentionally (i.e., they openly show that they intend to provide information) with their offspring, enhancing correct language use (Clément & Dukes, 2017; Csibra & Gergely, 2009). A combination of imitation and teaching has then the characteristics required for acquiring a complex signal system such as human language.

For the case of nonhuman animals, recent advances in data analysis (Lamon, et al. 2017; Hobaiter et al., 2014; van de Waal et al. 2010) have led to general acceptance of the existence of social learning for (presumed) socially acquired traditions. There is debate though on the kind of social learning that can be found. Important for the investigation of arbitrary signals and other opaque knowledge in nonhumans is that both imitation learning and natural pedagogy-like teaching are problematic notions for nonhuman primate research: for teaching, at best, few anecdotal descriptions can be found (see review in Gruber, 2016), and, for the presence of imitation learning, the verdict is still out (e.g., Whiten et al. 2009, Tennie et al. 2012).

For iii) & iv) Cognitive requirements for arbitrary (i.e., "conventional" or "semantical") meaning in words and signals

Human words are *semantically* meaningful (Hurford, 2007) because they refer to or stand for one particular entity or group of entities context-independently, no matter in what context the speaker produces them (e.g., Bach, 2006). Words have this property of being context-independently meaningful because we all, as part of a language community indirectly committed to using the word in a certain way (e.g., Lewis, 1969). That is, we agree on a *language convention* of the word's use, which amounts to its semantic meaning. For example, the term 'grizzly bear', if used according to convention, refers to a representative of the particular animal species. The genesis of a new conventional meaning may start by one speaker intentionally using a word in a novel way (Grice 1957; Millikan 2005). Listeners over time may infer how the word is used in this novel way, and if the new use serves a purpose, may go on using the word in the same way. On the side of cognitive requirements for human children to learn new uses, according to established research complex learning (i.e., imitation: requiring the grasping of the speaker's intention to learn x) and teaching processes are involved in grasping arbitrary meanings of words (Moore 2013), as well as mindreading capacities (i.e., inferring the intention used by communicator when using a word in a novel way, see Bloom 2002). Neither teaching nor imitation appears to be generally accepted as present in nonhuman animals, the same goes for mindreading, based on empirical studies (Tomasello 2014, but see Krupenye et al. 2017 for diverging results).

3. Central literature Approaches to explaining social learning within an affective framework:

Clément and Dukes (2017) have recently argued for the existence of Affective Social Learning (ASL), a type of social learning that concerns the social transmission of values through the display of affective states. ASL as envisioned by Clément and Dukes provides a template to analyze potential emotional mechanisms involved in social learning in human and nonhuman animals. Clément and Dukes describe four stages of such learning: emotional contagion, affective observation, social referencing (the latter two constituting social appraisal) and natural pedagogy. The four stages involve increasing cognitive complexity, but each of them is defined by the importance of affective states involved that facilitate learning in a naïve individual. Their proposal builds largely on the notion of social appraisal. Social appraisal refers to the phenomenon whereby people evaluate situations based on others' emotions (Manstead & Fischer, 2001). Other individuals' affective states ascribe value to, for example, a certain object if they display certain emotions toward that object. What we believe to be worthy of focusing on is thus strongly influenced by others' testimony, via their emotional reactions. This is the case independently of others providing such clues intentionally. For instance, in a study where participants were seated in a room and smoke appeared, they were less likely to report the danger if other individuals displayed disinterest (Manstead & Fischer, 2001). The central idea of ASL is that knowers as potential teachers provide testimony about a given object

(physical or not) through displaying affective states. A mother engaging with an object for instance, being immersed in the interaction with it, provides testimony of the object being important to the learner, and the learner will therefore focus on the object. The mother's display of an affective state of interest thus creates the setting for the child to learn about the object or about how to engage with it independently of how actively the mother actually engages with the potential learner. A famous example of social appraisal is the crossing of a 'visual cliff' by children (Gibson & Walk, 1960; Klinnert et al., 1983). In this scenario, young children approached a transparent board, their mothers placing a toy on the other side of the 'cliff.' Young children moved or stopped moving on the cliff depending on the positive or negative affective state displayed by their mothers. It seems like the mother provided them affective information on whether it was dangerous to cross the cliff.

4. Current state of the applicant's research in the field:

I wrote my dissertation on "Ostensive intentional communication in nonhuman animals", discussing what ostensive intentional communication amounts to with regard to involved cognitive mechanisms of the communicators. On this topic, I published a book chapter and several articles in collaboration with M. Wild (University of Basel), T. Gruber (University of Geneva), S. Townsend and M. Fröhlich (University of Zurich). Building on these elaborations, I was awarded an Early.Postdoc Mobility grant, during which I re-assessed cognitive requirements and mechanisms involved to the case of conflict negotiations in animals. I particularly focused on imitation learning. Here again, in analogy to the discussion surrounding intentional communication, two positions, one claiming metarepresentation to be necessary for imitation and the other claiming that empirical data on nonhuman animals showed that metarepresentation is not a fundament of imitation learning are facing each other, without any foreseeable progress towards an agreement.

In collaboration with Prof. Fabrice Clément (University of Neuchâtel) and Prof. Thibaud Gruber (University of Geneva), I re-assessed the framework of affective social learning (ASL) originally outlined Clément and Dukes (2017) for the human case for an application to cases in nonhuman primates that may constitute examples of the various stages of the ASL framework. As part of this project, I published one chapter (Gruber & Sievers 2019) and an article (Sievers & Gruber 2020). The re-assessment demonstrated in broad strokes how affective states are involved in social learning. What this analysis is lacking is a detailed application of ASL to not just cases of social learning but communicative concepts more generally, which will be part of this project proposal.

Following from my previous research, I am deeply familiar with the discussions surrounding the concepts to be investigated for the project, their descriptions and definitions in the literature and the empirical data relevant to the project. This will serve as a starting point for writing the research proposal.

5. Methods

One of the main methods of Theoretical Philosophy is the analysis of concepts. Traditionally the aim when analyzing concepts, such as for instance the concept "knowledge", is to describe it as accurate as possible: What does it mean and entail *to know* something? **Conceptual engineering** as opposed to this traditional approach is not a descriptive endeavor but a normative and revisionary one (Cappelen 2018). The conceptual engineer aims to assess and improve concepts. The claim that concepts are defective in the sense of being vague or indetermined is not novel, but deeply embedded in philosophical tradition: According to Carnap (1963), improvements of a concept should be measured relativized to purposes. There is no unique correct meaning or description of any term. The improvement then is always relative to contextually specific purposes.

The calibration method on the other hand, described as such by Andrews (2015) deals with the importance of the integration of empirical data into re-analyses of concepts and behaviors linked to the concepts. By taking into account behaviors of other species that appear to be closely related to human behavior displayed in the same context, we can, by collecting further empirical evidence, establish that both behaviors have the same underlying cognitive mechanisms.

Conceptual engineering as stated aims to assess and improve concepts with the question in mind: what should the concept mean, given a certain overall aim? Such a question implies that concepts and their meaning can be defective in some way and require amelioration. It also implies that any concept's meaning could have other meanings than the one it has at a certain point in time in a certain context. Concepts, that is, could have better meanings as they have currently. Apparent examples are concepts such as gender and race. These concepts' meaning have moral and ethical implications. The project proposal aims to apply the

method to concepts used within comparative cognition research dealing with empirically centered research questions and empirical arguments for deficiencies of a concept.

Conceptual engineering requires two stages of re-assessment: first **the description of the deficiencies of the concept (1) and secondly, the development and proposal of ameliorative strategies (2)**.

For this project focusing on comparability between human and nonhuman animal communicative capacities, applying conceptual engineering and the calibration method leads to the following research questions:

- (1) What are the deficiencies of the concepts in question that lead to issues integrating empirical studies that suggest lower cognitive capacities involved in communicative capacities in humans and issues evaluating the presence of intentional communication, social learning etc. in nonhuman animals?
- (2) What are potential ameliorative strategies following from (1)?

As the main point of disagreement between the opposing positions in each debate is based on empirical data, i.e., cognitive complexity involved or not involved as demonstrated by the research, the **calibration method** will be utilized to **re-assess the concepts** in accordance to (1): As already laid out, conceptual engineering so far was not applied to cases of concept amelioration based on empirical grounds, but rather for moral and ethical reasons. The application of the calibration method within conceptual engineering introduces the possibility of integrating empirical research as premises for the re-assessment within the methodological framework of conceptual engineering.

Concretely, **the calibration method** allows for empirical behaviors to be described *as if*/behaviors were linked to certain concepts, without being sure whether the cognition necessary for the concepts are actually present, e.g.: “vervet monkeys intend to warn their conspecifics about an approaching predator.”, or: “A child understands that their mother’s pointing indicates an intention to draw their attention towards the pointing direction.” We can describe both observations as an instance of intentional communication. To verify whether these are indeed instances of the later, we look at the concrete features of the concept’s definition. For intentional communication, one central feature is the presence of a complex intention by the recipient to realize that the speaker has the intention to inform them. Different empirical research articles that investigate this feature will be used as decision-makers: Is the feature indeed present in the cases described? The same procedure will be in place for further, central features. If *for both cases* - the human and the nonhuman case - relevant empirical research exists, suggesting that the feature might not be in place, it follows that it is questionable whether the feature is actually present for the concept, and it is here, where these features may be replaced by affective explanations, and the **ameliorative process (2)** starts.

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