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Christensen, Bo Allesøe

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Networks as a case of distributed cognition

Bo Allesøe

holds an MA and PhD from Aarhus University, and has taught at Aarhus University and is currently teaching at Aalborg University. His main work lies in analysing the implicit anthropological assumptions behind cultural economic theories, and has been published in various journals.

Abstract

Within the development of recent theories of epistemologies, notions of situated, embodied, extended and distributed cognition has been objects of study. Cognition is here seen as instantiated within different relationships, or networks, obtaining among humans and the world. However, what is shared by participating in a network is seldom addressed. This article will analyse and sketch the possibility of understanding a cognitive network, exemplified by a crime scene investigation, involving shared cognition understood as *distributive ampliative cognition.*

Keywords macrocognition, CSI, distributive ampliative cognition, material inference

Introduction

This article will analyze networks as involving distributed social cognition, and will base this description on the development of the extended mind approach. Overall this approach focus on the contribution to cognitive processes by structures and things external to the mind (Wheeler 2005; Robbins and Aydede 2009). Thus, net-

works can be characterised by distributed cognition, e.g. humans and non-human artefacts like mobile phones are related through central cognitive processes being distributed among them. Recall that not long ago remembering phone-numbers was a distinct and important everyday discipline. Presently, however, all of this mind-consuming behaviour has nearly been off-loaded to everybody's respective smart phones replacing what was done in the mind before. The mind is, in Clark and Chalmers memorable phrase, extended (1998), with objects in the environment sometimes functioning as part of the mind. Though this is similar to developments within sociology (see Latour 1995; Hutchins 1995, 1995a) and anthropology (see Ingold 2000), the limited space of this article prevents the engagement with these other developments. Instead the purpose of the article is addressing how participating in a network is committing to something macrocognitive, involving a normative relation between a communality both presupposed and projected. The aim is describing this commitment as involving a specific ampliative inferentiality. First, I will present a short history of the extended mind hypothesis locating a problem in understanding what we actually share when we partake in a distributed process. Next, I will use a crime scene investigation for addressing this problem. This will lead to some criteria for understanding the distribution, and lastly, a sketch of networks as a case of distributed cognition involving ampliative inference will be made.

A short history of the extended mind hypothesis

Following Cash (2013) the extended mind hypothesis comes in three phases. The first phase is Clark and Chalmer's original position (Clark and Chalmers 1998), claiming that certain objects separate from us nevertheless function as part of our cognition, i.e. the environment has an active role in driving cognitive processes. Clark and Chalmers argued for this stating the parity principle claming:

> "If, as we confront some task, a part of the world functions as a process which, were it done in the head, we would have no hesitation in recognizing as part of the cognitive process, then that part of the world is (so we

> claim) part of the cognitive process. Cognitive processes ain't (all) in the head!" (Clark and Chalmers 1998, 8)

Thus, since there is a functional similarity or equivalence between remembering a phone number in the head and by using the phone, the phone counts as part of the cognitive process. Obviously, processes "in the head" function as paradigm for what cognitive processes are, and as Cash claims (2013, 62) this creates an individualist point of departure for Clark and Chalmers. In addition, the parity principle seems to imply the limitless of extending my cognitive processes. They could, in principle, involve every person I talk to, every book I read and multiple internet sites I visit, etc. on equal footing.

The second phase, related to Menary (2010, 227-243), tries to limit the extension of the mind, claiming that the external processes doesn't duplicate processes that could take place in the head, instead they complement or integrate with the cognitive processes of the mind. Thus the cognitive system has a boundary including only those external resources forming an integration with the internal process. Here the mobile phone is not part of my extended mind, but the phone augments the mind so both become an integrated whole – it complements my remembering. The problems here are, first, this is still is an individualist way of understanding the cognitive process. How a group of people could be augmented by technological devices, for example in a multiplayer computer game, would, if it was touched upon, probably be described as an aggregation of the people involved. But the group, as a category in itself, might display other characteristics when augmented, characteristics not capable of being modelled on the augmentation of an individual. Second, the mobile phone is severed from the cultural practices in which it is used, hence as Cash (2013, 63) claims, attention to the social and cultural aspects of distributed cognition is bypassed.

The third phase, therefore, emphasizes these social and cultural aspects. One example here is Gallagher's (2013) focus on the institutional character of distributed cognition. His example is the legal system forming a system of individuals, tools and cultural practices. This way, it enables cognitive processes to emerge, for example decisions in particular court cases, impossible without the engagement between the institution and the individuals who are connect-

ed with it. For Gallagher (2013, 7) this goes beyond the parity principle, because the legal system as a case of distributed cognition could not, even in principle, be done in one or two person's heads. Rather, the individual cognitive actions are both derived from and contribute to the cognitive and normative practices making up the legal system which we collectively partake in.

Now the problem here is, how this normative process of contributing to something we partake in actually happens. How can the process be both shared and distributed, hence more than what is happening in either of our heads, but at the same time something individuals *as* the individuals they are, can contribute to? In the following a crime scene investigation will be used as an example for discussing this question.

CSI as an example of distributed and macrocognition

Crime scene investigation is a particularly interesting case since it involves cognition on many levels and displays many, if not all, of the characteristics presented above. Departure here will be Baber *et al* (2006) and Christensen (2013) showing the distributed nature of a crime scene investigation, and expressing a sort of macrocognitive process. Let the murder scene taken from Christensen (2013, 67) be an example: a body has been found on the floor in an apartment, the carpet around the body's head is soaked in blood coming from what looks like an open wound, an empty purse and a wine glass lie on the floor, and drawers are open with clothes scattered around. Ostensibly this is a robbery turned into a murder crime scene, which the CSI documents by correlating different kinds of representations of the crimes scene.

The overall process of a crime investigation can be described through, first, a crime scene being reported, second, the apprehension of a perpetrator or the investigation of all other lines of inquiry, and lastly, the crime being filed. Baber *et al* (2006, 357-358) outlines the following sequence of events as most likely taking place:

1. "Crime committed, crime reported, incident created.
2. Scene investigated, evidence retrieved.
3. Offender caught or identified and charged.

4. File compiled by File preparation, receive all information on the enquiry, from the Police: Witness statements, Crime Scene notes, Forensic reports, etc.
5. File sent to CPS (the persecution service), decision made whether to prosecute.
6. Decision made to continue, file made available to defence barrister.
7. Defence or prosecution may request additional examinations during the course of the trial.
8. All information, used and unused should be made available and declared using an "unused evidence" form (submitted with the statement).
9. CSI, Police, etc. are requested to submit a statement of actions to the court.
10. On some occasions if counsel has questions concerning the evidence they will call the witnesses to court, along with the relevant evidence."

Differing people and things are here involved in specific actions taking place on different locations, but still with an interconnectedness appearing. First, policemen arriving at location, judging what occurred, and requesting the crime scene investigators to arrive. The CSI then documents the crime scene taking pictures, collecting and recording evidence, decide additional investigations, and finally disseminate the evidence to the next link in the investigative chain, the prosecutor's office (CPS). They prepare and eventually go to trial making a case against the defence barrister, persuading the court of the alleged offender's guilt. Important to notice here is:

First, each link in the investigative chain is dealing with the world in an engaged and committed fashion. The CSI team, for example, knows how different kinds of evidence collected at the crime-scene are not only properties of the crime-scene, but express also a certain propriety, i.e. they afford being placed within proper crime technological and judiciary justifications, what Thevenot (2007, 411) terms an order of worth, a specific evaluative inferential space. Hence, the collected evidence function as material inferential resources for action, both in a physical sense of picking up and bagging the crime-scene purse in the example above for additional DNA and fingerprint searching (Baber *et al,* 358-359), and in a more communicative

sense by creating different representations of the actual and possible role of the purse by taking pictures and notes entering into the final crime report (Baber *et al* 2006, 363; Christensen 2013, 64-65).

Second, the work done by each link in the investigative chain serves purposes transcending their specific investigative and contextual behaviour, by projecting the knowledge procured onto the good of the investigative communality as a whole (Thevenot 2007, 418). The purpose of the CSI team, for example, is not only documenting the specific crime scene, but also being part of grander purposes, like cooperating for finding the guilty or establishing new criteria for crime scene investigation.

Combining both points each team or link is organised around, or held together by, a specific crime scene case as *presupposing a sense of communality*: each team knows how to align their efforts with the other teams: documenting evidence must be made in such a way it can be used by the prosecutor in court, and the prosecutor makes his case using the specifics of the different representations of the crime scene investigation. In addition, each team is also working towards *establishing a sense of communality*: making the best possible case in accordance with the purpose of a joint macrocognitive effort, i.e. realising the investigative communality as a whole, but always facing the uncertainty of not necessarily being successful. Hence, the ongoing experience this joint effort provides is not necessarily frictionless. The knowledge procured need not be based on straightforward conditions among the members of the different teams: instruments might be calibrated in wrong ways, evidence might not be found or might be understood in the wrong way, and people might work against each other without necessarily compromising the investigation as a whole, etc.

Furthermore, as List and Pettit (2011) has argued regarding decision making through a sequence of events, the decisions made by each party in the investigative process and on a macrocognitive level might be different, the latter even going against the recommendations or interpreted findings of all the parties in the investigative chain. As a relevant example of this, Lackey (2014, 2-3) describes a murder trial where "Each member of the jury is privy to evidence that the defendant was seen fleeing the scene of the crime with blood spatter on his clothes, but it is grounded in hearsay that, though reliable, was ruled as inadmissible by the judge." Thus as a

group the jurors believe the defendant is innocent, but *individually* many of the group members do not, since they trust the reliable hearsay evidence. Hence, as Ballet *et al* (2006, 380) claims, without elaborating upon though, inquiring into what is shared by participants across the investigative chain is highly relevant. So how are we to understand this dynamic not necessarily harmonious macrocognitive communality shared, i.e. both presupposed and projected, by the CSI and CPS?

The challenges of macrocognition

Before indicating how this sharedness could be understood, let us *via negativa* and based on the example just described, provide some plausible criteria for how this sharedness ought to be characterised. First, one obvious understanding of this macrolevel should be bypassed, namely that it is made up of one or more people representing all the people involved as well as the result of their total effort – *the no singular representation thesis*. In this sense, the CPS (the prosecutors) represents the effort of all people involved in making the case, and manifest thereby the definite prosecutorial authority of the judicial decision-making as a whole. The problem here is, obviously, that this ignores the network of relations and many different representations serving as the conditions for the prosecutors to function in the first place. Hence, the notion of a group, or collective comprising this macrolevel is not addressed in a serious manner. Put more bluntly, it simply bypasses the communality in question, i.e. the macrolevel is nothing but a single representation of the concerted effort of the involved parts. Now certain forms of network might function like this, or aim to, for example religious groups with powerful leaders, but in the case above this seems somewhat nebulous.

Related to the singular representation thesis is what we might call *the non-aggregation thesis*, a group is not equal the sum of its members (see Lackey 2014, 2). This is one consequence of the examples by List, Pettit and Lackey presented above, that what happens on the macrolevel can be divergent from what happens in each of the parts making up the macrolevel. Take two people walking down the street, most people will claim a difference between walking together and walking beside each other, despite the physical appearance can be identical. So to put it another way, the macrolevel, two people walking together, cannot be reduced to the aggrega-

tion of its parts, i.e. walking beside each other (Gilbert 1990). Hence, the team-effort of both the investigative and prosecuting team is more than the sum of the individual members' respective effort, thus we say they work together and not just with each other. Even if we supply their individual efforts with some sort of descriptive common knowledge like knowing how to collect and interpret evidence in such a way to be best transferable among the links, this still doesn't capture the exact sense we are looking for. First, because it is still adding up, and second, a substitute with the same training could do the same job without really being part of the collective. Third, there is something engaging and compelling about working or walking together, not captured in sharing some piece of common knowledge. A group is not a property of individuals only, but a propriety in its own right. Hence, there is a normative dimension to being part of a group not captured by just postulating some shared common knowledge. At least not without understanding how this knowledge is committing in a proper sense.

Lastly, the *no reification thesis* that even if we grant that the macrolevel is different from each individual part connected to it, we cannot reify this macrolevel as something separate from the parties involved, like a group mind (see Schmid 2009; 2011). Saying "We solved the crime" this "we" is not something over and above the parties involved but must, in a meaningful way, be ascribable to each of the parties involved in their own distinctive ways. The CSI uttering the sentence enacts a partaking of this we in a different manner than the prosecutor, thus "we" means partaking in something bigger than each party but in their specific ways.

Now meeting these challenges seems to indicate that what is shared is not only distributed but also of an ampliative nature, it presupposes a relation to a non-reified communality extending beyond the distributed parts. Using Robert Brandoms' notions of material inferentiality and normative pragmatics, will provide a first preliminary sketch of this sense of ampliative.

Macrocognition as distributive ampliative cognition

Etymologically ampliative comes from latin *ampliatio* connoting a sense of broadening, enlargement or exceeding of something already existing or known (Will 1988), and has been used within philosophical logics since medieval times. Important precursors in-

volve *inter alia* Immanuel Kant's notion of synthetic judgment, where the act of predicating implies some piece of objective knowledge is *added* to our knowledge of something. An addition which below will be understood as understanding what it is one commits oneself to by using a concept (predicating is using a concept *of* something, placing it in an inferential space of implications) This is, for Kant, in contradistinction to the analytical judgment where the predicate merely describes what is already implicit in a subject. A second example is C. S. Peirce who in his studies on abductive reasoning claimed that the conclusion in certain forms of inductive inferences, like concluding from some x are y to all x are y, exceeds the content of the premises. Hence, concluding has more a character of an informed generalisation than a strict logical validity. In the CSI-case this would be uncovering the best account of the evidence in each link (like the premises), and *projecting* this onto the common good of the investigation (the conclusion). So *ampliatio* indicates the combination of presupposition and projecting in the sense described above.

Now the kind of reasoning involved in our case study can hardly be understood or described as a pure formal logical process, instead it contains relationships and dynamics between people and things which cannot be formalised without losing the significance of these dynamic relations. Thus, the notion of ampliative cognition involving a certain kind of inferentiality might seem misplaced. However, I will present Brandom's non-formal notion of material inference understanding inferring as a kind of correct doing (his normative pragmatics) a inspiration, but without doing a fully justification to his complex thought[1] (Brandom 2000, 52-55). This is congruent with our case and the challenges above, and will contribute to our understanding of the sense of adding or enlargement, ampliative implies.

An example of a material inference would be inferring from "Aalborg is north of Odense" to "Odense is south of Aalborg". Brandom (2000, 53) claims that no specific logical competence is involved in this kind of inference, instead knowing how to use the central concepts of the sentences, and especially how the *content* of north and south is related to the world of Danish geography, is what matters. So we are dealing here with non-formal kinds of reasoning, expressing an engagement with the world (people and things), expressed

through communication (see above, page 4). Now imagine the complexity of material inferences related to the CSI at the crime scene. Understanding "This glass is a piece of evidence", relates both to the contextual procedures of the different people processing the crime scene: asking questions like was it used for drinking, and acting like bagging and labelling which is communication to the laboratory etc. Hence, it relates to the next link in the investigative chain: if this glass is evidence, then the DNA analytics want us to handle it this way and they, then, handle the evidence in a form suitable for court hearings. As soon as the glass is denoted evidence, it is placed within a web of material inferential relations acting as a compass for what to do, and not to do, and how people relate to each other. The glass, so to speak, structures how the people are supposed to act around it, both in terms of concrete handlings and in terms of how other related concepts are used – lipstick on the glass is transformed from an everyday nuisance to investigative significance of who put it there. So the inferentiality here is not about logical form, it denotes the material connections between the content of the concepts, i.e. the communication, used throughout the chain between the CSI and CPS. Hence, predicating evidence of the glass adds something new to our knowledge of this glass' significance, and by committing to this predication we commit ourselves to the enlarged network of material inferences this glass is then placed in.

Furthermore, Brandom relates this sense of commitment, the inferentiality connected with holding something a piece of evidence with "…the sort of entitlement that is in question when we ask whether someone has good reasons for her commitments." (Brandom 2000, 43). Hence two commitments can be incompatible, e.g. claiming this apple is red all over and green all over, and we can therefore also hold what we later discover as incompatible beliefs, e.g. the suspected felony might actually not be the one who drank from the glass. What we realise upon this discovery is the lack of entitlement holding both commitments; we had the wrong reasons (what we were committing ourselves to through the material inferential relations comprising the glass and the felony) to suspect that the assumed felony was the same person drinking from the glass.

In parallel we can understand how people can contribute to the overall process of convicting the felony, but resist, knowingly or unknowingly, working as a team relating to the different links in

the chain. This can be understood as two possibly incompatible beliefs (commitment to contributing to the overall team effort and commitment towards specific team members), of which we can express worry about the entitlement to both, or eventually discover one of the entitlements as justified.

Either way the inferentiality thus depicted is part of ampliative cognition, creating a connection between presupposing a communality and establishing a new communality described above.

The view on ampliative cognition just presented goes against the singular representation thesis by focusing on the concrete material inferential relations dispersed in the investigative chain. We cannot understand this in an aggregative sense either, because the content of the concepts used is not totally convergent. The content related to using the glass as evidence is, for the CSI team, primarily related to documenting the crime scene (e.g. it is inferentially related to bottles or other containers used for pouring liquid stuff, perhaps poison, into the glass, as well as specific DNA techniques for handling lipstick). The CPS for their part understands the glass as one of many interrelated kinds of evidence, some not from the crime scene itself, building the case as a whole. So what the CSI and CPS do and their understanding of the significance of this doing is related and different at the same time. The material inferential relations making up the content of the glass as evidence are connected but shifts between the two teams as well. Hence, *pace* the reification thesis each part contributes to something bigger in their own specific way, but *pace* a sense of aggregation there is a sense of committing, a normative dimension directed or projected at the whole, being more than the sum of the parts.

So to conclude ampliative cognition holds a significant part of the key to approaching the sense of sharedness sketched. It connects the specificity of the material inferential relations with a sense of wholeness, that what each do is committed to or projected onto a larger sense of saying we.

References

Baber, Chris, Paul Smith, James Cross, John Hunter and Richard McMaster. 2006. "Crime Scene investigation as distributed cognition." *Pragmatics & Cognition* 14(2): 357-385

Brandom, R. 2000. *Articulating Reasons*. Cambridge, Massachussets, London, England: Harvard University Press.
Cash, M. (2013) Cognition without borders: "Third wave" socially distributed cognition and relational autonomy. *Cognitive Systems Research* 25-26: 61-71
Christensen, Bo A. 2013. Mere end repræsentationer i praksis. *Geoforum Perspektiv 23: 57-69*
Clark, A., Chalmers, David. 1998. "The extended mind." *Analysis* 58(1): 7-19. Reprinted in Menary (2010), pp. 27-42
Gallagher, S. (2013) The socially extended mind. *Cognitive Systems Research* 25-26: 4-12
Gilbert, M. 1990. "Walking together: A Paradigmatic Social Phenomenon." *Midwest Studies in Philosophy* 15(1): 1-14
Goldman, Alvin. 1999. *Knowledge in a social world.* Oxford, England: Oxford University Press.
Haugeland, John. 1998. *Having Thought. Essays in the Metaphysics of Mind.* Cambridge, Massachusetts and London, England: Harvard University Press.
Huthchins, Edwin. 1995a. "How a Cockpit Remembers Its Speeds." *Cognitive Science* 19: 265-288
Hutchins, Edwin. 1995. *Cognition in the Wild.* Cambridge, Massachusetts and London, England: The MIT Press.
Ingold, T. (2000) *The Perception of the Environment.* Oxon, England and New York, USA: Routledge.
Lackey, Jennifer (ed.). 2014. *Essays in Collectivist Epistemology.* Oxford, England: Oxford University Press.
Latour, Bruno. 1995. "Cogito ergo sumus! or psychology swept inside out by the fresh air of the upper deck..." *Mind, Culture, and Activity* 3(1): 54-63
List, Christian, and Philip Pettit. 2011. *Group Agency. The possibility, design, and status of corporate agents.* Oxford, England: Oxford University Press.
Menary, Richard, ed. 2010. *The Extended Mind.* Cambridge, Massachusetts and London, England: The MIT Press.
Robbins, Philip and Murat Aydede. 2009. "A Short Primer on Situated Cognition", in Robbins, Philip and Murat Aydede (Eds.) *The Cambridge Handbook on Situated Cognition.* Cambridge, New York: Cambridge University Press

Schmid, Hans Bernhard. 2009. *Plural Action.* Dordrecht, Netherlands: Springer Verlag.
Schmid, Hans Bernhard, Daniel Sirtes, Marcel Weber. 2011. *Collective Epistemology*. Heusenstamm, Deutschland: Ontos Verlag.
Thevenot, Laurent. 2007. "The Plurality of Cognitive Formats and Engagements. Moving between the Familiar and the Public", *European Journal of Social Theory* 10(3): 409–423
Wheeler, Michael. 2005. *Reconstructing the Cognitive World.* Cambridge, Massachusetts and London, England: The MIT Press.
Will, Frederick. 1988. *Beyond deduction. Ampliative aspects of philosophical reflection*. London: Rotuledge
Winograd, Terry and Fernando Flores. 1986. *Understanding Computers and Cognition*. Reading, Massachusetts: Addison-Wesley publishing Company.

Note

1 As Brandom connects his normative pragmatics to a semantics, I would also have to show how ampliative cognition is expressed through communication among the links in the investigative chain, as well as through the projection to a common level. This will involve tracing the expression of inferential connections between us, they, and we in the different speech acts and dialogues among the agents in the network.