

ANIMALS KNOWLEDGE: EITHER SIEVES OR HUMANS?

A false dichotomy in *Tacit and Explicit Knowledge* by Harry Collins¹

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ABSTRACT

In his book *Tacit and Explicit Knowledge* – while trying to explain to AI researchers why they should lower their expectations in the light of the findings about ourselves (referred to as *social cartesianism*) during the so-called ‘Second Wave of science studies’ – Harry Collins dignifies men (as opposed to computers) to such dizzying heights from where our common evolutionary roots with animals become completely invisible for him. In the paper I argue first that Collins forgets to defend his proclamations about our superiority and settles in incoherent logic, second that this seems unwise and we better remain curious about other living creatures around us to be able to learn more about ourselves (and not least to get still better in building intelligent machines). Thirdly introducing animals as experts I point to some discrepancies between this and his previous book *Rethinking Expertise* co-written by Robert Evans.

Keywords: knowledge, tacit, explicit, humans, animals, expertise.

1. SELF-IMPORTANCE EXPOSED

Having read the book *Tacit and Explicit Knowledge* by Harry Collins, throughout the pages I found myself wondering how I’m supposed to think about animals considering their „knowledge”. Not that this would affect the book’s conclusions or their importance – as Collins himself points this out². The book wants to emphasize

¹ I hereby wish to thank László Ropolyi for drawing my attention to the questions of the evolution of knowledge, Ádám Miklósi for giving priceless sources of modern comparative cognition, Karl Hall for introducing me to the topic of expertise, and everyone at the Polanyi circle.

² As Collins himself points out in the first chapter: „It may be that dolphins and chimps or even some other animals share the interpretative abilities of humans to some small degree. Whether this is true or not matters not in the least for this argument, since the argument covers entities with interpretative abilities; the proper extension of ‘entities with interpretative abilities’ does not have to be settled for the logic to remain coherent.” (Collins 2010:25, fn. 9)

the difference between humans and *machines* by pointing out our species' peculiar abilities (Social Cartesianism – see later) and also to demystify the supposedly misused term *tacit*. Being amazed myself how much money is spent worldwide on AI projects engineered by men never even heard the name of Wittgenstein I think we can be grateful to Professor Collins for trying to forgo so much disappointment.

But the treatment of animals in the book seems quite problematic even if for Collins this remains a secondary question at best. Though at the beginning for a short moment his intentions seem honest to elaborate on all the differences among animate and inanimate things, the book gets soon impatient and disqualifies animals suddenly from the realm of knowledge. On page 6 we read „The starting point is to think of knowledge as „stuff” that might also be found in animals, trees, and sieves and then try to work out from this starting point what is that humans have” in the same paragraph alluding to Wittgensteinian philosophy he proclaims „knowledge cannot be found in the absence of the activities of humans” and still on page 6 that „it remains the case that, in the last resort, humans are the only knowers”.

Of course to be able to dig such a big hiatus between humans and animals Collins breaks with the Polanyian approach of the tacit completely, and argues that the “idea of tacit is parasitical on the *idea* of the explicit” (Collins 2007:7). So reversing the Polanyian approach that ‘all knowledge is rooted in tacit’ he believes that creatures unable to explicate their mental states can’t be assumed to have tacit knowledge either. And though this *tension rule* seems a good rifle-pit to indicate differences between humans and computers, it jumbles the notions of cognitive capacity and communicative abilities, leaving nothing but confusion about the meaning of the word *knowledge*.

This application of ideas seems even stranger given that Michael Polanyi shows the deep common roots of intelligence in men and animals³ in *Personal Knowledge* spectacularly (coining the term: *active principle*). And while Polanyi – like Collins – is also ready to point out the source of the big difference between humans and other animals (namely: language) his explanation of the evolution of language as a continuous progress from animal cognition (by first learning the articulation of in-articulate representations, and then applying operational principles to the symbolic representations⁴) seems a much more exuberant analyses of how our mental capacities might work. More importantly, one of the precious clues *Tacit and Explicit Knowledge* gives to the Polanyian understanding of the idea of tacit knowledge is shading light to the socio-historical component of its birth: the dawn of computers.

³ Of course beside Polanyi’s account the whole theory of evolution started by Darwin believes the same: that all our cognitive abilities do emerge from animal cognition.

⁴ See *Personal Knowledge*, especially the fifth chapter: *Articulation* (Polanyi 1962).

The pioneers of the idea of tacit knowledge, reacting to the enthusiasm for science and computing typical of the 1940s and '50s that made the explication of everything seem easy – no more than a technical problem on its way to be solved – had to fight to create space for the tacit, and, as a result, they made it into something mysterious. (Collins 2010:7)⁵

Then again, seemingly understanding the stake of Polanyian philosophy Collins doesn't hesitate to muddle up the concepts, and even while trying to trivialize the notion of tacit he admits its ubiquity:

But nearly the entire history of the universe, and that includes the parts played by animals and the first humans, consists of things going along quite nicely without anyone *telling* anything to anything or anyone. There is, then, nothing strange about things being done but not being told – it is normal life. (Collins 2010:7)

And so the paradox logic of the “parasitical” conception of Collins becomes obvious. The term tacit knowledge makes only sense when it can be contrasted with explicit knowledge. The strange rule applies to animals as well, since according to Collins things or animals incapable of explicating their knowledge can't have tacit knowledge either – which means no knowledge at all. As the book states: „There is no animal explicit knowledge and, consequently, no contrast that would make sense of the term tacit knowledge in respect of animals.” (Collins 2010:80) „In fact, they don't „know” anything: they just transform strings. Cats, dogs, trees, and sieves just hunt, sniff, grow, and sift in the way that a river flows”. (Collins 2010:78) But segregating humans from animals so desperately is not only futile in the process of understanding our species true capabilities, but represents such a narcissistic self-conceit of human race that would make even most believers of creationism blush.

2. FORMS OF KNOWLEDGE AMONG ANIMALS

2.1. *The cases of explicit communications*

Now it might be time for me to confess that I do have two dogs, and if only because they have blinded me with their cuteness: these pronouncements seem pretty fragile

⁵ Note that probably this explains only part of Polanyi's motivations since his opponent was positivism. The important difference remains nevertheless, as pointed out among others by Mihály Héder and Stephen G. Henry, that while Collins deals with *knowledge*, Polanyi speaks about *knowing*.

And even if for Collins the brain-functions of a squirrel might be easy to understand, most ethologists would be dubious whether only “the pioneers of the idea of tacit knowledge (...) made it into something mysterious”.

for me. Human language is not the single way of explication and just because animals don't speak as eloquently as humans do they can – and often do – explicate themselves: if we accept the definition of the term by Collins. In his book the basic elements of explication are *strings* (“bits of stuff inscribed with patterns” (Collins 2010:16), not being meaningful in themselves), and communication takes place when an entity “is made to do something or comes to be able to do something that it could not do before as a result of the transfer of a string.”(Collins 2007:20) And an entity “will have been enabled to do something if it can use what has been transferred in some productive way – [...] having new and useful knowledge.” (Collins 2007:21) Along these lines Collins argues that if while watching a soccer game someone obstructs my view, a „gentle push to move your bulk” is considered a *string* (Collins 2010:57), and thereby already a form of explication: since easily interpreted as telling „please move aside”. Given this it seems trivial that when my dogs drill their muzzle under my hand it should be also considered as a form of explication: they ask for scratching. Accordingly when intensely stretching in “upward facing dog” pose in the hall they explicate they want to go for a walk, when during a stroll they swiftly turn back and look up to me they let me know they hear a car coming, and so on.

It's true though that some ethologists deny that dogs would be really animals (Csányi 2012:45), since the ten-thousands years of domestication and co-evolution made them very humanlike creatures and extremely sensitive to human communication (Morell:2014). But explication is not a unique habit of dogs, in fact most animals communicate in many explicit (audible, olfactory, visual or other) ways – using strings undeniable, which are interpreted by companions. The example of bees seems so obvious they are even mentioned by Collins himself (Collins 2010:29). Collins is of course perfectly right, we probably shouldn't call their dance a language: but if it's explicit or not is hardly a question! The strings used by bees are so unambiguous even humans are able to interpret it – and important decisions of the bee hives are made with the help of these enabling communications.⁶

At the end we might consider not wanting to call knowledge whatever it is that animals possess – the book suggests the world *mechanism* instead – but for this we will have to find a completely new reason: the ‘incapability of explication’ argument is insufficient here. For if we really tried to treat animals and humans “as undifferentiated entities” also according to the ‘tension rule’ we should probably believe that just as with humans if a small part of someone's knowledge she herself can somehow explicate (e.g. ‘how I balance my bike’ – theoretically explicable for Collins) then all other parts of her knowledge might be righteously called tacit (‘how to drive in traffic’ – a case of *collective tacit knowledge* in the book). The extreme bias of Collins against animals is probably most transparent in his treatment of what he

⁶ For closer analyses see Riley 2005.

calls *somatic tacit knowledge*. Using the famous example of bicycle riding he argues that contrary to Polanyi the technique of balancing is nothing mysterious and even Polanyi himself explicates the rules of bike riding “just three pages after he says they are tacit”. (Collins 2010:100) Collins explains that if “we rode our bikes on the surface of a small asteroid with almost zero gravity so everything happened much slower, we ourselves could probably use Polanyi’s rule to balance.” (Collins 2010:100) “This is knowledge that is tacit because of our bodily limits even though it can be explicated” (Collins 2010:101). So it turns out that for Collins the mere possibility of an explication is enough to count something a knowledge – but only in the case of humans. Whereas in the case of animals even obviously explicit communications are denied to carry meaning. But what’s the point in prohibiting the use of the word ‘knowledge’ while witnessing the many ways animals communicate explicitly? The 192 pages of *Tacit and Explicit Knowledge* give little help here.

2.2. *The possibility of the “social cartesianism” among animals*

Though abandoned swiftly in the book, the supposed rule of ‘undifferentiating among entities’ sounds quite defensible. Obviously not just because Polanyi (let alone Darwin) argued so convincingly about our common heritage with the cognition of animals. Modern research in ethology (more precisely: comparative cognition) has shown many times that animals manifest capabilities resembling very much to what Collins refers to as *collective tacit knowledge*. For Collins this capability – also called Social Cartesianism – is what makes us really human and embodies our culture: “actions that require different behaviors for successful instantiation depending on context and require different interpretations of the same behavior depending on context.” (Collins 2010:125) The main example in the book is bicycle riding in traffic, which “includes understanding social conventions of traffic management” and “involves knowing how to make eye contact with drivers at busy junctions”, and which is why “bike riding in Amsterdam is a different matter than bike riding in London, or Rome, or New York, or Delhi, or Beijing.” (Collins 2010:121) For Collins this is the final frontier where robots shall never be able to follow us.

Now in the case of animals we can agree that whatever they do they don’t use language – then again of course language is seldom if ever used when riding a bicycle in Amsterdam or elsewhere. Being so proud of our species abilities to engage in social life we might be surprised how many things animals can comprehend in similar ways. Members of many different species are proven to keep track of one another individually and consider past acts when deciding how to act with whom. Corvids for example, living in large social groups, not only remember where their companions have cached food, they also learn to remember individually who saw them caching their own and develop strategies accordingly to reduce the chance of being pilfered (Clayton 2007). Jackdaws and Pinyon jays keep track of whole social

hierarchies and records of who won the last fights and even use transitive inference to decide who to help in an upcoming fight (Paz-y-Mino 2004; Mikolascha 2012). Though usually we don't treat fish as extremely intelligent species, they can also learn about third party relationships by eavesdropping; and not only among themselves (e.g. Siamese fighting fish – Oliveira 1998), but some even follow the complex social networks *interspecific*. Since there's an opportunity to cheat, the mutualism among cleaner fish and their clients depends mainly on the efficiency of the *distinctive reputation* of the cleaning fish – which some clients (e.g. Australian reef fish) are really good at (Bshary 2006).

Social intelligence is naturally of great importance among many mammals: vervet monkeys for example are famous for learning acoustically distinct alarm calls – and apt reactions – for three different predators (snakes, leopards and eagles). What's more they not only learn to discriminate harmful raptors (hawks and eagles) from equally large but harmless birds (storks and vultures), but they also rank the authenticity of each other's calls continually. And if a partner is starting to give false alarms they soon learn to disregard the calls of the “paranoid” fellow (Chenaya 1988) – beautifully satisfying the criteria of Collins for context dependent interpretation. At last we can mention Chacma baboons, members of the primate order. Living in complex societies the evolution of the baboons led to developments in sensitive interpersonal skills: they pay minute attention to the affairs between other specimens and approach, hide or try to deceive everyone accordingly (Crockford 2007). Considering that among baboons consortships may change many times a day this means quite elaborate social intelligence. Again, it might still be possible to argue that we shouldn't call these interpersonal skills in animals ‘social cartesianism’ but the examples Collins gives us are completely out of line for that claim. Denying that animals can outperform sieves is untenable from a cognitive stance.

3. ANIMALS AS EXPERTS

Collins draws our attention to the importance of expertise. In his book written with Robert Evans in 2007 *Rethinking Expertise* they claim that the most solid forms of knowledge and science per se are found when looking for different experts, and that it crystalizes in how people gain authority as knowers in our societies. However animals can also function as experts. In the everyday life of human societies we find them all around, often not just helping to engage our leisure time but even assisting our workflow. Maybe Jared Diamond exaggerates when insisting that domestication is the “most momentous change in Holocene human history” (Diamond 2002). In any case awareness of the presence of animals in our societies is not a luxury for pet-lovers, but a necessary component in understanding how human societies emerged and endured.

Probably dogs would come again to our minds in the first place: chasing away burglars and thieves from our homes, shepherding the live-stock, pulling sledges were all important parts of human history, even if by now we've learned to substitute them with alarm systems, electrical fences and motorization. But we still use dogs every time we try to rescue people from demolished buildings after earthquakes, or when trying to detect some dangerous or illegal materials. The social trust in the skills of these dogs is so strikingly unanimous around the globe no scientist or other human expert could have ever dreamt to enjoy. And if – as the main demarcation criteria for real sciences offered by Collins and Evans – we try to find the “Locus of Legitimate Interpretation” in the case of rescue dogs we have to realize that the locus is extremely on the “left” in the Chain of meaning (Collins 2007:121). That is all the rights of interpretation belong to the producers of the knowledge (dogs and maybe their keepers) and none to the consumers of the knowledge (the people rescued and their relatives). According to *Rethinking Expertise* (written only 3 years before *Tacit and Explicit*) rescue dogs seem to represent one of the strongest forms of expertise imaginable – in no way excludable from our club.⁷

And the line of examples goes on. Recently more studies report (McCulloch 2006) about dogs being able to diagnose different kind of cancers at inchoative stage, which is of high importance given that the survival chances are tied to early diagnosis and that clinical detection is usually problematic. Dogs are nevertheless absolutely not unique in being able to help humans in societies. Sniffing can be better done by wasps and rats, approaching burglars might be signified as well by crickets, carrying weight is usually more efficient with elephants or horses – and some tasks are completely out of a dog's realm, like chasing mice to protect the larder, or underwater echolocation (being a special skill of dolphins used mainly in warfare). What might be even more important is that pets seem to have a very direct effect on humans well-being: and given the exponential growth of the wellness industry (from psychology through sports to nutrition crazes) the rising need to cherish ourselves is an important phenomenon. So if nutrition professionals and psychologists count as experts in enhancing the well-being of their customers, than the animals capable of the same thing must be recognized as equally important parts of our societies. Again even fish count: aquariums in the waiting rooms of dentists have been used over decades to relax the patients with clear benefits (Katcher 1984). Using animals

⁷ Nevertheless Collins is perfectly right that animals differ from humans in very important aspects, and that we shouldn't forget about the differences. According to contemporary comparative cognition studies one main discriminatory item as pointed out correctly by Collins is *language*. The other, probably in close relation to it, is *theory of mind*. However close animals – potentially apes or dogs – might get to these abilities, they unambiguously fail to reach human levels. But inferring from this that animals are equivalent with sieves seems strange. It seems to be a case of false dichotomy.

in different therapies is also common place at least since Freud's dog Jofi: dogs⁸, cats, rabbits, horses (Benda 2003) and even dolphins (Nathanson 1997) are used in many ways (Macauley 2004) to help to improve the life of disabled children or adults dealing with addictions and emotional issues. Even without the involvement of any psychotherapist methods, the simple fact of having a pet at home seems to improve the life of the owners (Anderson 1992; Serpell 1996).

4. CONCLUSIONS

When Harry Collins tries to draw the contours of *social division of labor* all these activities must mean something to him as well. It's quite obvious that at least some of the aforementioned skills of animals make them experts⁹. And can we believe that expertise is affordable without knowledge? We can't. In *Rethinking Expertise* Collins himself did not think that either. Regardless of how we would like to call these skills – knowledge, expertise, competence etc. – it is obvious that animals too have it. And even if this doesn't affect the main conclusion of the book regarding computers, the otherwise noble attempt "to resolve these confusions and (...) to produce the coherent account of tacit knowledge" (Collins 2010:ix) fails in the case of animals quite explicitly. Contradicting Polanyi's famous statement leads to more problems than solutions; and accepting the 'tension rule' makes the new notions of tacit and explicit knowledge more incoherent.

Of course for Collins the main target is the actor-network theory (ANT) of Latour. Rejecting the human-centered approach of the sociology of scientific knowledge (SSK), ANT treats humans and non-humans (animals as well as things) symmetrically – rendering itself "impotent" (Collins 2010:166), and also being incompatible with the idea of Social Cartesianism. And though this symmetrical understanding by Latour might be misleading (making humans as unaccountable as a battery), doing the extreme opposite and handling humans and non-humans completely asymmetrically and treating animals and inanimate things symmetrically seem equally untenable from Collins.

⁸ See at <http://prisondogs.blogspot.hu/>

⁹ This seems to be true whether we accept the definition of expertise by Collins or others. Beside a form of knowledge expertise might be defined also as exceptional performance (Ericsson 1996) or as a social construction (Agnew et al 1997). Nevertheless as William S. Helton very consistently argues non-humans can't be excluded from expertise based on any product-oriented definition of it (for Collins this probably means the strings but also the "enabling" through communication): "Whether expertise is regarded as a social label, exceptional performance, or knowledge, some non-human animals appear able to satisfy the definition." (Helton 2005:72)

REFERENCES

- Agnew, N. M.; K. M. Ford; P. J. Hayes. 1997. Expertise in context: personally constructed, socially selected and reality-relevant? P. J. Feltovich, K. M. Ford, R. R. Hoffman, eds. *Expertise in context: Human and machine*. 219-44. California: AAAI Press.
- Anderson, W. P.; C. M. Reid; G. L. Jennings. 1992. Pet ownership and risk factors for cardiovascular disease. *The Medical Journal of Australia* 157(5):298-301.
- Benda, W.; N. McGibbon; K. Grant. 2003. Improvements in Muscle Symmetry in Children with Cerebral Palsy After Equine-Assisted Therapy (Hippotherapy). *The Journal of Alternative and Complementary Medicine* 9(6):817-25.
- Bshary, R.; A. S. Grutter. 2006. Image scoring and cooperation in a cleaner fish mutualism. *Nature* 441(7096):975-8.
- Cheneya, D. L.; R. M. Seyfartha. 1988. Assessment of meaning and the detection of unreliable signals by vervet monkeys. *Animal Behaviour* 36(2):477-86.
- Clayton, N. S.; J. M. Dally; N. J. Emery. 2007. Social cognition by food-caching corvids. The western scrub-jay as a natural psychologist. *Philosophical Transactions of the Royal Society B* 362(1480):507-22.
- Collins, Harry. 2010. *Tacit and Explicit Knowledge*. Chicago: The University of Chicago Press.
- Collins, Harry; Evans, Robert. 2007. *Rethinking Expertise*. Chicago: The University of Chicago Press.
- Crockford, C.; R. M. Wittig; R. M. Seyfarth; D. L. Cheney. 2007. Baboons eavesdrop to deduce mating opportunities. *Animal Behaviour* 73(5):885-90.
- Csányi Vilmos. 2012. *Írónikus etológia*. Budapest: Sanoma Media.
- Diamond, Jared. 2002. Evolution, consequences and future of plant and animal domestication. *Nature* 418(6898):700-7.
- Ehmann, R. et al. 2012. Canine scent detection in the diagnosis of lung cancer: revisiting a puzzling phenomenon. *European Respiratory Journal*. 39(3):669-76.
- Ericsson, K. A. 1996. The acquisition of expert performance: an introduction to some of the issues. In: *The road to excellence: the acquisition of expert performance in the arts and sciences, sports and games*, ed. K. A. Ericsson. 1-50. Mahwah: N.J. Erlbaum.
- Héder, Mihály. 2012. Explicit knowledge in the philosophies of Collins and Polanyi. *Polanyiana* 2012(1-2):45-58.
- Helton, William S. 2005. Animal expertise, conscious or not. *Animal Cognition* 8:67-74.
- Henry, Stephen G. 2011/2012 A Clinical Perspective on Tacit Knowledge and Its Varieties. *Tradition and Discovery: The Polanyi Society Periodical* 38(1):13-7.
- Katcher, A. H. Segal; A. Becka. 1984. Comparison of Contemplation and Hypnosis for the Reduction of Anxiety and Discomfort during Dental Surgery. *American Journal of Clinical Hypnosis* 27(1):14-21.
- Macauley, B. L.; K. M. Gutierrez. 2004. The Effectiveness of Hippotherapy for Children With Language-Learning Disabilities. *Communication Disorders Quarterly* 25(4):205-17.
- McCulloch, M. et al. 2006. Diagnostic Accuracy of Canine Scent Detection in Early- and Late-Stage Lung and Breast Cancers. *Integrative Cancer Therapies*. 5(1):30-9.
- Mikolascha, S.; K. Kotrschala; C. Schloegla. 2013. Transitive inference in jackdaws (*Corvus monedula*). *Behavioural Processes* 92:113-7

- Morell, Virginia. 2014. How Dogs Know What You're Feeling. <http://news.sciencemag.org/brain-behavior/2014/02/how-dogs-know-what-youre-feeling>
- Nathanson, D. et al. 1997. Effectiveness of Short-Term Dolphin-Assisted Therapy for Children with Severe Disabilities. *Anthrozoos: A Multidisciplinary Journal of The Interactions of People & Animals* 10(2-3):90-100.
- Oliveira, R. F.; P. K. McGregor; C. Latruffe. 1998. Know thine enemy: fighting fish gather information from observing conspecific interactions. *Philosophical Transactions of the Royal Society B*. 265(1401):1045-9
- Paz-y-Miño, G.; A .B. Bond; A. C. Kamil; R. P. Balda. 2004. Pinyon jays use transitive inference to predict social dominance. *Nature* 430:778-81
- Polanyi, Michael. 1962. *Personal Knowledge*. London: Routledge and Kegan Paul.
- Riley J. R. et al. 2005. The flight paths of honeybees recruited by the waggle dance. *Nature* 435:205-7.
- Serpell, J. A. 1996. Evidence for an association between pet behavior and owner attachment levels. *Applied Animal Behaviour Science* 47(1-2):49-60.
- Shettleworth, Sarah J. 2010. *Cognition, Evolution and Behavior*. Oxford: Oxford University press.