What Dolphins Want:
Animal Intentionality and Tool-Use

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ABSTRACT

I argue that at least some animals have the sort of intentionality philosophers traditionally have ascribed only to humans. I argue for this through the examination of tool-use among New Caledonian crows and Bottlenose dolphins. New Caledonian crows demonstrate advanced tool-manufacture and standardization, while Bottlenose dolphins use social learning to a much greater degree than other animals. These two case studies fit nicely with many of the non-linguistic accounts of intentionality employed by philosophers.

This thesis is aimed at showing that our basic philosophical concept of intentionality leaves room for intentional behavior on the part of non-human animals. In the literature, descriptions of human behavior are often contrasted with that of "lower" animals. Many have taken rationality as the characteristic that separates us from animals, and our notions about the superiority of humans have been passed down through theology and philosophy. From Plato onward, philosophers have created divisions that put humanity in a special position relative to all other creatures. Neglecting a careful analysis of animal behavior in making these divisions does a disservice not only to the animals themselves, but also to humans. This thesis is an attempt to start pulling out for examination a thread of the discussion about the specialness of humans. Specifically, I examine the case of intentionality in the framework of the tool-related behaviors of crows and dolphins.

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Chapter I: Introductory Remarks

The Onion, a satirical newspaper, ran a fake story entitled “Study: Dolphins Not So Intelligent On Land”[1] where dolphins were given 11 tests to demonstrate their intelligence, from communication ("our study group offered only three types of response to every question... a nonsensical, labored wheezing, an earsplitting barrage of unintelligible high-pitched shrieks, and in extreme cases, a shrill, distressed scream") to echolocation (which fails miserably for the dolphins in the study who have been taken out of water for all the tests). While this study is meant to poke fun, there is an underlying problem with this fake study that we see often in the study of animals by philosophers: the dolphins are given human tasks to test their intelligence, not tests in which they can demonstrate intelligence on their own terms. The test is rigged from the beginning; humans always 'win' at being the most intelligent, advanced, special, gifted species. Hoorah for us.

In this thesis, I contend that, if we hope to be fair philosophers, we need to re-think projects on philosophical intentionality in light of the tool-use, culture, and abilities demonstrated in recent field studies of non-human animals. Many people will be willing to concede the intelligence and tool-making abilities of apes, monkeys, and chimps right away, as we often consider these primates as dumber versions of ourselves, as ancestors and relations. However, in this thesis, my focus will not be on proving that primates have intentionality. Rather, I hope to make a more difficult case. Specifically, I will argue that crows and dolphins have intentionality, the “about-ness” that philosophers discuss as

1 “Study: Dolphins Not So Intelligent on Land” 2006

special to human beings. Since at least Aristotle, we have often thought of all other animals as ruled by instinct. Humans are, of course, the 'rational animal,' and no other. We need to re-think this position in light of recent research and in light of the notions of intentionality we have that seem to leave room for non-human animal intentionality. I aim to show that our basic philosophical notions about intentionality actually fit animal behavior. I will show that a*t least some* animal behaviors are intentional.

Showing that at least some animal behaviors are intentional is the first step to re-conceptualizing animal intentionality and action in philosophical frameworks. This thesis is not this larger project, but the ramifications of this work extend far beyond work in intentionality to epistemology, philosophy of mind, and philosophy of technology. My specific interest is in the last of these, so most of my examples in this thesis are pulled from studies of tool-use, which shaped my decision to look at crows and dolphins specifically. There is plenty of interesting, exciting research going on involving other animals, but, to make my point, I need only show that at least one non-human animal species has intentionality.

The structure of my argument looks like this:

(P1) Philosopher X defines intentionality as Y.

(P2) Animal Z acts in a way that demonstrates Y.

(C) Y indicates intentionality, so Animal Z is a creature who has intentionality.

Of course, things are never this clean, but this is the basic outline of my demonstration that non-human animals can act intentionally. I can show that non-human animals have intentionality if we use an unbiased definition of intentionality. To pursue this demonstration, I break this thesis into the following structure:

Chapter I: Introduction – here we are

Chapter II: Theories of Intentionality – 3 theories considered & the argument begun

Chapter III: Animal Evidence – where I marshal the evidence for animal intentionality

Chapter IV: Intentional Animal Behavior – the conclusion, in which I make the argument, more fully supported and definitive

Chapter V: Further Considerations – in which I look at the possible broader impacts of this type of research and defend against a few possible criticisms.

Pursuing intentionality in this way will allow my argument to be made succinctly in Chaper IV. Chapters II and III work to give evidence for the conclusions I draw in Chapter IV. And Chapter V looks at the ramifications of this work.

Examining philosophical concepts in light of animal research is not a new research program. Environmental epistemologists, like Christopher J. Preston and Mark Rowlands, have already explored this terrain by looking at how place, evolution, and environment play into the abilities of humans and non-humans.[2] Philosophers of mind

2 Rowlands 2005; Preston 2002; Preston 2003

and cognitive science have also seen the importance in looking at cases of non-human animal behavior in order to make careful distinctions.[3] The question of intentionality has also been put to into concert with animal behavior by some philosophers.

Daniel Dennett allows that we might attribute "intentional states" to those beings that demonstrate rational patterns of thinking, and some animals will meet this criteria.[4] But, Dennett has been criticized for not being "entirely clear about what exactly constitutes a rational pattern".[5] And, indeed, this criticism seems to draw out the point that rationality, according to our experience with it, might not be the most rational in other environments with other constraints. David Beisecker points to the importance of making errors in animal intentionality.[6] Specifically, Beisecker argues that intentionality has to do with expectations and instruction:

> [M]ost cases of animal instruction are probably too instinctive for this instruction to be counted among an animal's non-biological goals. Mother cats, for instance, might train their offspring to hunt simply out of instinct.[7]

Beisecker goes on to say that until researchers have explored the matter in better detail, it is best not to rule on whether animals have intentionality.

However, I think there is a way to side-step much of the debate surrounding

3 Dennett 1995; Davidson 1975; Dennett 1987; Nagel 1974

4 Dennett 1995

5 Beiseker 1999

6 Ibid.

7 Ibid.

animal intentionality by looking at cases of tool-use. Too often philosophers concerned with intentionality point to linguistic standards as being important to the argument. Language is often called a tool, a very special, helpful tool, but we might do equally well to look at non-verbal tools. Literature from philosophy of technology discusses the role of know-how and the material encapsulation of knowledge as an important indicator of knowledge, separate from any propositional or linguistic context.[8] This thesis introduces philosophy of technology as a way to sort out whether some animals can be said to have intentionality. Dennett's non-linguistic criteria might be good, but Dennett allows for rationality to matter, and, while it might be important, pinning down rationality is no small task. I think we can make this job easier by focusing on knowledge that gets encapsulated in the process of performing goal directed behaviors. By examining tool-use specifically, we take another route to understanding the work of animals in light of our philosophical theories of intentionality. Most theories of intentionality, even those that are non-linguistic, are ill-suited to deal with non-propositional content. However, we can work with existing theories to help say something about where some animals stand with regard to intentionality. I put forth this thesis in order to start synthesizing cutting-edge animal research with philosophical accounts of intentionality in the framework of tool-use, manufacture, and development. I use, as often as possible, field studies. While studies in animal laboratories can tell us lots of interesting things about the *capacities* of animals, what is possible seems to be less important to the question of intentionality as what is *actually done without significant human intervention*. What do our findings and observations about animals in their natural habitats tell us about what they think and do?

8 Hall 1978; Baird 2004; Baird 2002

Here, I rely on the assumption that we can look to behavior and context to infer intentionality, which allows us to move from animal behavior to what they think. In order to make a fair assessment, I feel that this move must be made. Since we cannot exactly ask a dolphin or a crow what it is doing and why it is doing what it is doing and what it is thinking about without falling prey to the sort of impossible, dolphin-out-of-water standards we see from the satirical *Onion* piece, we have to rely on making sense of the behaviors and creations of these animals as best we can within their own habitats. For the purpose of this thesis, this methodology is assumed, and, though I think a behaviorist methodology is warranted and justified for this type of study, I will provide no further justification of it here.

My specific case studies are limited to New Caledonian crows and Bottlenose dolphins, though I do sometimes make references to other cases of animal tool-use along the way. My main argument, however, deals with only the crows and dolphins. Tool-use, broadly construed, may not be the only non-linguistic indicator of intentionality and may not always serve as an indication of intentionality; however, in the cases I present here, the specialized tool-use, learning, and manufacture among crows and dolphins indicates intentionality on several conventional accounts.

Chapter II: Theories of Intentionality

The premise of this thesis is that at least some animal behavior can be classified as intentional in a suitably strong philosophical sense. One problem with this claim is that what counts as intentional in the philosophical sense sometimes seems to be a moving target. Specifically, different philosophers take and use different notions of intentionality. The purpose of this chapter is to bring forth three very different accounts of intentionality from the philosophical literature. I will argue that, on any one of these accounts, at least some non-human animal behaviors can count as intentional. Now, there are some philosophical accounts of intentionality that will not work for this project, and I will spend some time defending against these accounts. Specifically, linguistically-based accounts of intentionality seem implausible, and I will spend some time making this argument in Section A.

Section A. Descartes, Language, and Animal Abilities

In this section, I use Descartes to argue that linguistic accounts of intentionality will not suffice. Descartes is just one philosopher, but his argument about animals and language is similar to many other linguistic accounts of intentionality and thought that we find in other literature.[9]

9 It might be argued that Descartes is irrelevant to modern work on intentionality. However, neo-Cartesians, like Noam Chomsky, and even non-Cartesians in popular work often repeat these basic arguments that we find in Descartes. Therefore, it seems sufficient to look to Descartes' argument, which we see echoed even in recent work.

Descartes, in *Discourse on Method*, Part Five, sets up two barriers to entrance in the category of reasoning men. Descartes claims that animals and machines will never be able to do two things – things which allow us to recognize other reasoning beings. Descartes thinks these two things will allow us to judge with certainty whether a thing is a 'true man'. First, only men use words and symbols to convey their thoughts. Even if a machine or parrot could utter a word, it could not manipulate words in such a complex manner as "even the dullest men can do."[10] Second, only men can "act in all the contingencies of life." Machines and animals simply aren't complex enough to perform the array of activities and tasks that men can. [11]

Literature from discussions of artificial intelligence, evolution, and animal studies can all be rallied against the claims Descartes makes in *Discourse*, Part Five. To the first point, dolphins are thought to have a capacity for communication and social learning that is rivaled only by some primates. Dolphins make a wide array of sounds, and, though they do not manipulate our words in the way we do, they are capable of great expression.[12] Dolphins pick up on signs, can use abstract reasoning to manipulate their environment, teach new techniques to their social groups, and socially interact in a way "the dullest men" simply cannot.[13] To Descartes' first and second points, some parrots have been tested to levels of intelligence that rival that of a 5-year-old human child (certainly not the "dullest" of men) and verbal skills that at least map up to human 2-year-

10 Descartes 1637/2003, page 56

11 Descartes 1637 page 57

12 "At Home in the Sea." 2008

13 Pryor 1998; Krützen et al. 2005

olds. Their intelligence is a flexible one; parrots have the ability to give the incorrect answer to a puzzle (when they know the correct answer) and manipulate language. Some parrots can even purposefully answer questions wrong to frustrate testers.[14] Birds as a general category have long been underestimated in terms of intelligence and ability to perform a multitude of complex tasks. New Caledonian crows in particular have been studied for their ability to manufacture two types of standardized hook-tools, as we will discuss in greater detail in Chapter III.[15] In general, these newer animal studies point to great abilities among animals in terms of verbal and complex activities that have gone under-recognized. While I can concede that these animals do not speak as humans do or perform all the same tasks specific to humans (like working a fax machine or tying shoelaces), these animals studies do present a problem for Descartes' description of what makes human beings somehow higher than other “non-reasoning” forms of life. Parrots in particular can use words in a way that contends with “the dullest of men” - a standard Descartes sets up. They can also act “in all the contingencies” of *parrot* life and respond to new situations and environments and perform complex tasks.

Even if there were not animal cases that met Descartes criteria, the criteria themselves should be objected to. Descartes takes human intelligence as primary, yet he is willing to imagine as part of thought experiments (meditations) that the world is nothing like we know it. He must certainly be able to imagine types of languages that look nothing like ours and arrays of activities in which men are not the most fit or adaptable. I question also whether his language requirement in his first barrier is really

14 Veness 2006

15 Hunt 1996

necessary; certainly, we can think of cases where people did not know how to communicate, but were fit with rational, intentional minds (pre-Annie Sullivan Helen Keller for instance). His action-performing barrier is also problematic because there seems to be no reason to prioritize human tasks and the array of tasks we can do as they compare with some animals. There are plenty of tasks we cannot perform, especially in unfamiliar environments. In fact, dolphins are much better suited for the tasks which they perform than humans could be. Dolphins might, in fact, respond in a more flexible and diverse way than humans would, faced with the same stimuli in the *dolphin* environment. Simply put, Descartes does not know what it is like to be anything but a human, and his insistence on standards of human language and ability to perform tasks seems to utterly dismiss the possibility of reasoning in dolphin terms. Descartes takes his two hallmarks of 'true men' to rule out the possibility of animals and machines acting with the same (or better than the) reasoning capacity of men, but, put in new environments and faced with new situations, humans might very well not possess the appropriate reasoning capacity.[16] For this reason, I think the barriers Descartes erects to separate human beings from other animals must be razed. We must look at animal behavior with fresh eyes to make a fair assessment.

Criticisms of Descartes' linguistic account of what it means to be rational apply equally well to linguistic accounts of intentionality. Indeed, I find these accounts

16 There's actually really nifty dolphin research going on now that shows that dolphins and birds think in more dimensions than humans do because their environments involve movement in more directions. This necessary part of their world shapes their mind in a way that actually makes them better at some spatial reasoning tasks.

insufficient to actually deal with what it is we do, since not every one of us has language. Certainly, language can indicate intentionality of a creature, but the statement in reverse not the case. Intentionality does not require linguistic ability. To understand better how intentionality and language ought to be related, I turn to Millikan's evolutionary account in Section B.

Section B. Millikan's Intentionality & Animal Behavior

Ruth Garrett Millikan argues in *Language, Thought, and Other Biological Categories* (1984) that "intentionality... is not a clean-cut phenomenon. The notion 'intentionality'.... is unified not by a definition but by a paradigm."[17] Millikan gives an account of intentionality whereby intentions make no sense outside the context of their evolutionary history.

> For only in virtue of one's evolutionary history do one's intentional mental states have proper functions, hence does one mean or intend at all, let alone mean anything determinate.... [A being simply dropped on Earth by a cosmic accident would] have *no liver, no heart, no eyes, no brain,* etc.... because the history of the being would be wrong. For the categories "heart," "liver," "eye," "brain," and also "idea," "belief," and "intention" are proper function categories, defined in the end by reference to long-term and short-term evolutionary history, not present constitution or disposition.... Ideas, beliefs, and intentions... are such because of what they are, given the context of their history, *supposed* to do and of how they

17 Millikan 1984, page 86

are supposed to do it.[18]

Intentionality springs from an evolutionary history where intentional capabilities provided a survival value. Broadly, intentionality applies to any device with a proper function, Millikan tells us; we have a sense in which something "*intends* or *means* or *means to do* or *is meant to do.*"[19] In a more typical way, we cannot say that everything with a function has intentionality. Millikan suggests, that since intentionality is better regarded as a paradigm than a definition, we might identify what she calls "intentional icons" to help us identify devices that "are 'supposed to' map thusly onto the world in order to serve their direct proper functions."[20]

Millikan gives us four intentional icons, which she claims "exhibit the 'ofness' or 'aboutness' that one usually associates with intentionality."[21] Millikan, perhaps conceding to the linguistic camp, gives her accounts of the icons in terms of sentences, but other signs could easily apply to the reasoning she gives, and she even says a bit about animal behavior before explicating her paradigm:

> Bee dances seem to have something in common with sentences, but it is hard to suppose that the interpreter bees actually identify – roughly, understand the reference of – the mapping aspects of the dance-maps they observe. The act of identifying the referent of an element of an intentional

18 Millikan 1984, page 93, emphases in her text

19 Millikan 1984, page 95

20 Millikan 1984, page 95

21 Ibid., pages 95-6

icon is, I will argue, a very special act that requires a special analysis.[22]

Bee dances may be an easy case to dismiss, but the behavior of dolphins and crows is much harder to dismiss as non-intentional. Honey bee dances actually exhibit many of the characteristics of intentional icons when performing their bee dances.

The first characteristics of an intentional icon is that the sentence be "a member of a reproductively established family having direct proper functions."[23] In other words, "a sentence is part of a family of sentences having the same gross overall surface form."[24] A family of sentences has the same syntactic structures, the same notions of "well-formed," and the same relations with the world. In the case of bee dances, they count as intentional icons under this criterion because there is variety to the content of bee dances, but there is a proper syntactic form which must be used. The second characteristic of intentional icons is that the sentence "stands midway between two cooperating devices," a producer and interpreter, which are "designed or standardized" to fit each other."[25] Intentional icons mediate between two parties who are suited to this task by evolutionary processes. Bee dances fulfill criterion two, despite the presence of a process to learn the dance, because the mechanisms to produce and interpret the dances are standardized by evolutionary processes that allow for cooperation.[26] The third characteristic is that the sentence work "to adapt the cooperating interpreter device" so that proper functions can

22 Ibid., page 96

23 Ibid., page 96

24 Ibid., page 97

25 Ibid., page 97

26 Ibid., page 98

be performed under the appropriate conditions.[27] The receiver of the sentence or sign should respond in the appropriate way upon receiving it. Bee dances fit by this criterion. The fourth characteristic of the paradigm involves the mapping of intentional icons to the world.[28] Millikan spends a long time describing this, but I will only say what is necessary for my project. Millikan divides the fourth characteristic into two portions to deal with imperative intentional icons and indicative intentional icons. The bee dances are imperative intentional icons because the mapping involves an interpretation that accords with particular rules developed historically. The dances map onto the world with a real configuration involving nectar, the sun, and hives. Imperative intentional icons, when interpreted correctly, are used to produce something "onto which the icon will map" in the world; when received and obeyed, these sentences are mapped with historically-developed mapping rules onto the world.[29] Indicative intentional icons are mapped with historically-developed mapping rules onto the world when "they cause *true* beliefs in hearers."[30] This means that, with indicative intentional icons, the interpretation of the icon will vary more among humans than we see in the case of bees.[31]

Millikan gives us an interesting account of intentionality which easily incorporates animal behaviors when the animals work in communities, and I really do not need to make any further argument about how to fit animal behaviors in Millikan's

27 Ibid., page 97

28 Ibid., page 97

29 Ibid., page 99

30 Ibid., page 99; Millikan goes on to add stipulations to this characteristic, but this limited explanation should suit for our purposes.

31 Ibid., page 99

paradigm. However, Millikan's account rules out *a priori* the possibility of lone animals having intentionality since her intentional icons rely on communication. One can have thoughts about something and have a sense of 'aboutness' without communicating it. Millikan's account, however fresh and progressive, seems to still rely heavily on linguistic assumptions that seem to make this account biased toward creatures who operate with language or something like it. It seem as if linguistic frameworks would only arise in those animals who live in social groups and whose survival entailed the use of symbols. Millikan still retains some of Descartes' language-bias. However, language, one tool among many, though it might require intentionality, does not need to be the only possible marker of intentionality. For the most part, Millikan's intentionality is well-suited to discussions of animal intentionality, and she would have little objection to the inclusion of some animal behavior into the realm of intentionality. However, the way in which Millikan discusses intentionality is unusual, and it might do some good to look at more traditional accounts.

Section C. Hanser's In-Between Account

In “Intention and Teleology,” Matthew Hanser provides a middle ground in the traditional discussions of intentionality.[32] Hanser sketches out two accounts of intentionality, what he calls a narrow account and a broad account. He thinks both of these accounts have problems and works to develop his own. While Millikan dealt with intentionality as a natural, historical phenomenon, Hanser addresses his comments specifically to intentional mental states. He takes it as a given that there is a difference between what a

32 Hanser 1998

being does with an intention in mind and what a being does with foresight; he also holds that intentionally doing something involves doing it as an end or a means to an end.[33] Hanser characterizes the narrow account as making two claims: (1) “an agent does something if and only if he does it either as an end or as a means to an end” and (2) “the notion of a means must be understood 'strictly and narrowly'.”[34] The broad account holds that “an agent does intentionally pretty much anything he foresees doing in acting as he does.”[35] The broad account, of course, is too broad in classifying too many things as intentional in Hanser's opinion; the narrow is too narrow to count all the sorts of things we'd like to count as intentional.

Hanser claims the narrow account involves deliberation (internal) over the steps to an end-goal. Acting intentionally under this model as he characterizes it involves acting with a specific intention. Situations where too many intermediate steps are used to get to such an end and situations in which negative or unintended consequences happen as a result of pursuing intended goals are not considered intentional actions under this account.[36] Even in this narrow account of intentionality, however, it seems as if some animals might qualify as intentional actors. Studies of apes presented in the NOVA documentary “Ape Genius” testify to the intentional behavior of these creatures that are so much like human beings.[37] Kanzi, a bonobo chimpanzee studied in captivity, will take

33 Hanser 1998, page 382

34 Hanser 1998, page 381

35 Ibid., page 381

36 Ibid, page 387

37 NOVA 2008

off the researcher's shoe upon being asked the question, “Could you take off my shoe, please?” And, upon verbal instructions that it might be easier if the shoelaces were untied, Kanzi will untie the laces.[38] This isn’t simple stimulus-response behavior any more than another persons’s responses to verbal cues would be because of the complexity of the request and the lack of non-verbal cues. In these cases, the researcher did not make a motion toward her shoes, and her face was covered so that Kanzi could not pick up on facial signals.[39] Kanzi is well-known in animal studies for his amazing abilities, and his simple intentional act of following the researcher's directions to take off the shoe (perhaps with the end goal of pleasing the researcher and getting a treat) demonstrate intentional behavior that fits within the narrow account. The broad account, where intentional action involves foresight, can also apply to the actions of Kanzi and others, as you can imagine for now.

Hanser works to loosen up the narrow account and tighten up the broad. Hanser sets up the problem with the narrow account with reference to a problem developed in Elizabeth Anscombe's 1957 work entitled *Intention*.[40] This problem gives situations for comparison. The first situation is one in which a person aims to kill people who live in a particular house; this person pumps poisoned water into the house water-supply to poison the people in the house. In this case, Anscombe concludes that the agent the person clearly works intentionally to poison the people. But, amend this situation so that the pumper knows that someone is out to kill the people in the house but fills up the cistern

38 Ibid.

39 Ibid.

40 Hanser 1998 page 288-290; Anscombe 1957, § 23-26

anyway, but does not want to be involved. In this case, Anscombe would say that the agent doesn't necessarily intend to kill the house's inhabitants; rather, the pumper was just trying to earn his living. Another amended situation is one in which we have the same result (death to the people from drinking the water), and where the person pumping the water into the house did not aim to kill the people in the house. Instead, the pumper was hired by the poisoner to pump this poisonous water into the house. This pumper knew the well was poisoned, having been hired and informed by the poisoner. The pumping-person was simply doing a job to pump water into the house. Anscombe will again conclude that the person does not work intentionally to poison the people, just to intentionally pump poisoned water to the house. Hanser thinks that this points to a big problem in the narrow account. Specifically, he worries that our intuition that these situations should be judged is not met by the current accounts available. The broad account would say that in both these cases the person works to supply the home with poisoned water. [41] Broad accounts of intentionality would, of course, see the same in terms of intentionality. For someone subscribing to a broad account, intentionality rests on whether the action is foreseen. So, in all the variants, the pumper foresees the poisoning of the people in the house, so they all acted intentionally for that end. This should not sit well with our intuitions either.

So, Hanser introduces a novel concept: autonomous teleology.[42] Autonomous teleology, suited to the examples above, is the idea that the person doing his job of pumping poisonous water to the house was doing an action which was being directed not just by his own ends. In the case of the person doing his usual job, he does not

41 Hanser 1998, page 389-90

42 Ibid., page 390

intentionally pump poisonous water, but the person who was hired specifically to pump the poisonous water does do so according to the purpose for which he was hired.[43] Hanser explains that

> Whenever an agent acts for the sake of an end, the things he intentionally does form a structured package. In standard cases, the entire structure is the product of the agent's own practical reasoning – it represents his plan for how to go about achieving his intended end... Now compare a case in which an agent does a job with the intention of thereby achieving some personal end. Here the agent's job description helps determine the structure of the package.... [Turning to the agent hired to pour the poison into the well,] The agent, through his practical reasoning, subordinates his job-related doings to his end of earning his pay. The teleological structure of his job... is determined by his employer's reasoning.[44]

Autonomous teleology helps us account for situations in which people are not acting simply for their own ends, but where their ends are used toward other ends by others. In other words, the ends of others can play a role in the intentional make-up of a situation. Furthermore, what we know about a situation matters to our intentionality. Hanser gives a lovely account of a Martian dropped into a museum who presses a plastic lever, setting off a fire alarm.[45] This Martian could not work with the intentions you or I do when we pull fire alarms in museums; knowledge of meaning plays into intentional action in

43 Ibid., 390

44 Ibid., 393

45 Ibid., 398

important ways. Hanser concludes that

> An agent does countless things in performing a single act. Some he does intentionally, others he does not. What sets the intentional doings apart from the rest, and what identifies them as expressions of rational agency, is the way they fit together into a unified teleological structure.[46]

Intentions involve not only the respective meanings of things and the knowledge agents have in a given context, but intentions involve the relation of these things to the actions performed. More clearly, when we see a series of actions leading to an end, this end may be understood differently by different parties (with differing levels of knowledge) in situations that are otherwise exactly alike.

How might we expect animals to fit into Hanser's account of intentionality that mediates between the traditional views? Hanser, unlike the other two philosophers with whom we've dealt, says nothing about animals. But, his reasoning is interesting as we look toward animal studies in Chapter III. Hanser's account gives us a new and interesting way to view studies on animals done in captivity that involve edible incentives. Often philosophers have reduced animals as creatures that act on instinct. However, we see in many animal studies situations in which these animals must reason something out in order to be rewarded. We can analyze the chain of intention with Hanser's descriptions and even make a clearer distinction between the ends of different animals in a system. Hanser's account of intentionality is one that might have us discount research done in a laboratory situation because, in that situation, the animals in question might be playing into ends which are not their own. This might give us an incentive to

46 Ibid., 398

look more carefully at studies done out in the field, rather than in the laboratory. While I will look at some laboratory studies to talk about the capacities of certain animals, my focus is on field studies, studies that I think better showcase the ingenuity exhibited by members of some species. This ingenuity looks a lot like the sort of thing we typically associate with the intentional behavior of our human peers.

Section D. Conclusions About Intentionality & Animals

Linguistic accounts, like Descartes' reasoning in Section A, cannot adequately account for the intentions of other species under any model because this type of intentionality is trapped in certain anthropocentric biases. If we are to approach intentionality in a fresh way, we have to let go of linguistic accounts. As Millikan shows us, language, like intention, was the result of evolutionary processes. If we acquired intention with our evolution, there is no way to state *a priori* that other species have not acquired something similar. While language may indicate intentionality, intentionality does not necessarily rest upon language. Milikan gives us reason to appreciate language as a developed capacity, much like intentionality, without pegging language as *the* separating mark between humans and non-humans or between the intentional and the non-intentional.

The next chapter of this thesis offers a series of cases where non-primates do really cool things that might remind us of the sorts of things that we do. I suggest in Chapter IV that these cases can be fit well into the non-linguistic accounts of intentionality briefly described in this chapter. If I can rally evidence that non-primate animal behaviors can be “about” something in the same way our thoughts can have

“about-ness” with the proper intentional icons then, by Millikan's accounts, some non-primates have intentionality. If I can rally evidence that non-primate animal behaviors can fit the narrow, broad, and intermediate accounts of intentionality that Hanser describes, then it is possible to conclude that at least some non-primates have intentions in the way we typically talk about philosophical intentions. I think that any adequate non-linguistic account of intentionality can be made to fit some animal behaviors. However, in Chapter V, I will also suggest some evidence that, even by linguistic accounts, at least some non-primates have intentionality.

Chapter III: Animal Evidence

In this chapter, I will show how tool-use by dolphins and crows points to intentional propositional content about the world. This section will be devoted to recent studies done of tool-use by New Caledonian crows (with comparisons to other types of birds) and the transmission of ideas between bottlenose dolphins. Most of the crow studies and the dolphins studies on which I focus here come from observational studies done in the wild, though some of the crow studies come from laboratory studies in which crows are surrounded by familiar objects and perform tasks that demonstrate their amazing tool-use and tool-manufacturing abilities. In the first part of this chapter, I examine the bird studies; I follow this by looking at dolphin tool-use; finally, I discuss the relationship between shared material cultures and propositional content.

I use examples of tool-use here, but the behaviors of bees, ants, beavers, and apes are all relevant. Bee dances, like those that Ruth Garrett Millikan argues, seem to have some sort of propositional content. Ant pheromones that relay messages to worker ants about where to go and what to do inside anthills might also contain propositional content in this way. However, to me, the studies of tool-use among animals are more compelling because of the normal ways in which we think of humans as being significantly different from other animals. Counting language as a sort of tool, we can see how tool-use among animals should give us compelling reason to reconsider our status as 'highest', 'most innovative', and 'most rational' animal. Tool-use in the dolphins and crows I will examine has reached a very high level of sophistication and, in some cases, culture. The making of

tools can be transmitted and shared within a group; tools can be standardized, but then used creatively. Just as language can encapsulate propositional content for us, we can also use tools and instruments to encapsulate or convey knowledge about the world around us.[47] Tools sometimes involve the encapsulation of propositional or non-propositional knowledge content, the usual subject of philosophical work concerning intentionality. If we accept this notion about tools, which is not a big step, then analyzing tool-use in terms of intentionality should not be difficult. These case studies of crows and dolphins should be taken seriously for what they might reveal to us about intentionality and its development.

Section A. New Caledonian Crow Studies

In New Caledonia, an island grouping in the Pacific Ocean near Australia ruled by the French government, amazing crows have been found to make and use several distinct types of hook-tools used to aid in the capturing of prey. These crows are not your average birds, and tool-use has not been documented among other birds to the extent and complexity it has been in New Caledonian crows (*Corvus moneduloides)*. Ecologist Gavin R. Hunt has noticed three features "new to tool use in free-living nonhumans: a high degree of standardization, distinctly discrete tool types with definite imposition of form in tool shaping, and the use of hooks."[48] In this one study from *Nature* in 1996, Hunt observed 68 crows carrying tools and four crows manufacturing tools.[49] He noticed crows

47 For a more complete discussion of this, see Baird 2004.

48 Hunt 1996

49 Hunt 1996

searching trees with their tools and sometimes transferring their tools between their beaks and feet or putting the tools down and then picking them up again before flying off. Two types of tools were collected by Hunt, types which he names the hook-twig tools and the stepped-cut tools.[50] Stepped-cut tools, which are made out of stiff *pandanus* leaves by the crows, are made by cutting along leaf edges so that the leaves become more tapered.[51] In this study, Hunt does not detail how stepped-cut tools are made (as he had not observed the process, only the product and its use), though he notes how neatly the crows seemed to cut the stepped-cut tools. He reports observing the manufacture of hook-twig tools, which involves the shaping of twigs in addition the removal of leaves and bark. Both tools, Hunt explains, have hooks that allow prey to be captured more easily. Hunt also adds that: "Hook use suggests an appreciation of tool functionality, and a tool kit suggests different tools for different tasks."[52]

Hunt continued observations on these crows, and, in 2000, detailed the manufacture of pandanus leaf tools, which he originally called stepped-cut tools.[53] This paper, which came out in the *Proceedings of the Royal Society*, explains how the *pandanus* leaf tool-manufacture and use involves a "human-like specialization."[54] Hunt explains the features of tool-use that were developed by prehistoric humans. Two features which Hunts points to in early tool-making that supposedly mark "the early signs of the

50 Hunt 1996

51 Hunt 1996

52 Hunt 1996

53 Hunt 2000a

54 Hunt 2000a

modern-like [human] mind": handed-ness in tool-use and the shaping of tools to a predetermined form.[55] Hunt has observed both of these signs of the evolution of the modern mind in the manufacture and use of the *pandanus* leaf tools. He points us to interesting work:

> The characteristic capacity of *Corvus* sp. [New Caledonian crow species] for `intelligent' behaviour may be related to their relatively highly developed forebrain (Voronov et al. 1994) which is responsible for avian learning and intelligence (Gill 1989). It would not be surprising, then, if a species of Corvus showed advanced tool behaviour (Plotkin 1997) and it would be equally unsurprising if crows at least in part learn their tool know-how. Crows do show flexibility in tool behaviour, which is seen as evidence of learning in chimpanzees (McGrew 1992) such as the making and use of two types of (hook) tool at a site (Hunt 1996) and distinctly different tool traditions in close proximity (Hunt 2000[b]).

Hunt's findings among New Caledonian crows are suprising, since it was once thought that only chimpanzees and humans had the capacity for tool-use. Hunt's findings also point to more advanced tool-manufacture on the part of crows than that which has been documented on chimpanzees in the wild.[56]

Hunt and his colleagues Fumio Sakuma and Yoshihide Shibata have made further observations on the tool-use of these crows.[57] In addition to their hook-shaping and

55 Hunt 2000a

56 Hunt 2000a

57 Hunt et al. 2002b

pandanus leaf tools, the crows have been observed to drop nuts from trees onto rock to break the nuts open, a tool-related behavior seen among apes and among several other species of crows. The case of the New Caledonian crow nut dropping is interesting for two reasons: first, the crows use the forks of tree branches to drop nuts from the substrate, rather than from their beaks; second, the crows repeatedly and non-randomly use the branch forks to aid in their nut-opening activity.[58] The crows, when they are unsuccessful in breaking a nut with the method on the first try, will try again; furthermore, these crows aim for a particular spot and work in 'tested' areas in which there has already been success in opening nuts.[59] Hunt and his colleagues give several possible reasons for this type of behavior; they never saw the crows use their beaks to drop the nuts – always the tree-fork method – from very well-used and familiar spots (judging by the wearing down of the rock and other nearby evidence of this sort of behavior). This method must be advantageous either for getting the nut cracked, for the predictability of the height of the drop and the eventual location of the nut, or for the purpose of saving time in finding a new location and testing it out.[60]

If this were not enough in the way of tool-related behavior, Hunt and colleague Russell D. Gray present findings for several more types of tools used by New Caledonian crows found over many parts of the islands and made from a wider variety of materials.[61] Hunt and Gray explain that crows should now be considered as part of "the exclusive

58 Hunt et al. 2002b

59 Hunt et al. 2002b

60 Hunt et al. 2002b

61 Hunt and Gray 2002a

group of species with the widespread manufacture of distinct tool types" that was once considered limited to only hominids.[62] Assuaging the doubters, the duo explains that "The use of hook-tools... is clearly related to Crow behavior and is not merely an incidental consequence of available resources because manufacture of hooked-tools requires material-specific techniques."[63]

Perhaps most provocative, Hunt and Gray, in a 2003 piece, make a solid case for the "cumulative technological evolution" of this tool-related behavior among New Caledonian crows. Hunt and Gray tell us that tool-manufacture is rare amongst animals, and complex material culture can only come through a cumulative technological evolution.[64] There are three characteristics of cumulative technological evolution that the pair provides as evidence: first, cumulative technological evolution involves a "diversification of tool design"; second, there must be a "cumulative change to tool lineages"; and, third, cumulative technological evolution involves a "faithful transmission of tool design through social learning."[65] Hunt and Gray think the New Caledonian crows should be considered to have evolved this "rudimentary cumulative technology," which they demonstrate through their tool collection of *pandanus* tools. The first two characteristics are easily met by this tool record. The third characteristic, the transmission through social learning, is "probable" because of the brain specializations of crows,

62 Hunt and Gray 2002a

63 Hunt and Gray 2002a

64 Hunt and Gray 2003

65 Hunt and Gray 2003

though this transmission was not witnessed by the researchers in the field.[66] Laboratory studies of New Caledonian crows help to support claims for this third characteristic.[67] One famous laboratory study involves Betty, a New Caledonian crow, in captivity, who was given a task that required the use of a bent wire to get a small bucket with food in it out of a small well.[68] Betty was able to perform this task repeatedly, and not just with strips of wire:

> Betty attempted to lift the bucket with the straight wire, and when this proved ineffective, proceeded to bend it into a hook, which she used to extract the bucket (Figure 11; Weir, Chappell, & Kacelnik, 2002)....Perhaps the crucial issue is whether Betty's wire-bending demonstrates causal understanding. In 10 trials following the initial observation, Betty was only given a straight wire and nearly always briefly attempted to retrieve the bucket with the unmodified tool (Movie 6), but then she consistently bent the distal end of it (i.e., the end not held in her beak) using two different techniques both involving fixing the tip of the wire and pulling laterally from the proximal end (Weir et al., 2002)...

Betty also seemed to learn and modify her use of tools to meet the requirements of the laboratory experiment:

> In subsequent experiments, Betty was presented with the same apparatus but a new material for tool making: flat strips of aluminium. On most

66 Hunt and Gray 2003

67 Morelle 2007

68 Weir et al. 2002

> trials, she first attempted to retrieve the bucket with the unmodified material, but the duration of these attempted probes declined rapidly (the median duration was just 3 seconds). After these attempts with the straight strips, in the first few trials she attempted to make distal bends, following her previous techniques (Weir & Kacelnik, 2006), but because of the properties of the new material she was unsuccessful. (The strips could not be wedged in a substrate in the same manner as the wire.) Betty then developed a new technique, proximal bending, that was more effective with the aluminium and which she used on all subsequent occasions (Figure 12a; Movie 7). This involved bending the end of the strip that was held in her beak, rather than the distal end as previously.[69]

Betty seems to be a very good tool-user to be able to use tools that she has not before encountered in her quest for treats. The field studies bolster the laboratory studies by allowing us to see this crow tool-use as typical and widespread amongst the New Caledonian crows.

Gray and Hunt have made even yet more significant finds in their study of the steps used in the 'crafting' of tools by New Caledonian crows. The team reports their conclusions as follows:

> The tool manufacture of New Caledonian crows has four features previously thought to be unique to hominids: a high degree of standardization, the use of hooks, ‘handedness’ and cumulative changes in

69 Bluff et al. 2007

> tool design (Hunt 1996, 2000; Hunt & Gray 2002, 2003). Recent work with a captive New Caledonian crow that bent wire to obtain food (Weir et al. 2002) suggests that, in contrast to chimpanzees (Povinelli 2000), these crows may have at least a rudimentary grasp of the physical properties of objects or 'folk physics'. The crafting of hooked tools that we have reported here further demonstrates that the tool-making capabilities of these crows are surprisingly similar to those of early humans.[70]

In this paper, Hunt and Gavin even provide a flow chart of the tool-crafting process of crows that looks eerily similar to flow charts of human engineering design activities.[71] Crafting involves the appropriate selection of materials, preparatory trimming, and sculpting of an object, and the research team observed these actions on the part of the crows in question; in addition, the researchers felt that, due to the variety of possibilities in materials, the crafting processes of the New Caledonian crows remained open-ended and flexible, something that has been reaffirmed through lab studies where crows are introduced to new materials, like wire.[72]

Hunt and Gray are right to question whether these crow studies are "chipping away at human uniqueness."[73] Hunt and Gray describe the complexities of New Caledonian tool use with reference to human and chimpanzee tool use:

> Skills considered necessary to move beyond chimpanzee-like toolmaking

70 Hunt and Gray 2004

71 Hunt and Gray 2004

72 Hunt and Gray 2004; Taylor, Hunt, Holzhaider, and Gray 2007; Winkler 2008

73 Hunt and Gray 2006b

> include a good understanding of, first, the physical relationships and functional properties of objects, and secondly, the intentions and goals of others (Heyes, 1993; Tomasello and Call, 1997; Povinelli, 2000). Research in the last 10 years has shown that New Caledonian crows (Corvus moneduloides) are complex toolmakers.[74]

The complexities of New Caledonian crow tool-use involves tools of two different materials and techniques (bent stick and cut pandanus leaf), and these tools can be made with different dimensions for different purposes or environments; their tool-use involves widespread participation by the species; their tool-use involves distinctions between the two types of tool groups with standardization in their manufacturing; their tool-use involves a cumulative change in manufacture over time; their tool-use indicates more sophistication than other birds, chimpanzees, and orangutans.[75] Additionally, the tools at specific sites are more alike than tools at other sites, indicating that the crows may use a pattern or set of rules in the sculpting of the tools.[76] This chart, taken from Hunt & Gray's 2006 paper on how crows chip away at human uniqueness, helps demonstrate just how advanced these crows seem to be[77]:

74 Hunt & Gray 2006b

75 Hunt & Gray 2006b

76 Hunt & Gray 2006b

77 Please note, however, that this chart was produced in 2003. Studies done in the past five years show lateralization, diversification, and distinction in chimpanzee tool manufacture. Several recent ape specials ("Human Ape" and "Ape Genius") highlight lists like this to see how close chimps are too human-like tool manufacture and sophistication. My use of this table is to point mostly to the crow and human cases, so I have not updated the table.

Table 1 Specialized features of tool manufacture at taxon level in free-living vertebrates

	Brown-headed nuthatch	Woodpecker finch	Crow	Orangutan	Chimpanzee	Humans
Distinct types of tools	---	---	+	---	---	+
Species-wide manufacture	?	?	+	?	+	+
Diversification	---	---	+	---	---	+
Hook tools	---	---	+	---	---	+
Target tool material	---	?	+	---	?	+
Different tools for different tasks	---	?	+	?	+	+
Making tools to rule systems	---	---	+	---	---	+
Lateralization	---	---	+	---	---	+
Sculpted tools	---	---	+	---	---	+
Cumulative evolution in tool design	---	---	+	---	---	+
Social transmission	---	---	?	+	+	+
Cultural variation	---	---	?	+	+	+

Reference sources in Hunt (2003). + = attribute present; ? = attribute might be present.

We should not underestimate the technological sophistication of New Caledonian crows. Hunt and Gray explain that there is circumstantial evidence that suggests the social learning of know-how among these crows.[78] These crows have also been found to have a discerning eye in choosing the proper tool for the job, and they seem to have a basic understanding of 'folk physics.' [79] There will be much for us to consider about these crows and to reconsider about our own uniqueness, but we should look at one other animal study for balance as we approach intentionality.

Section B. Dolphins & Tool-Use

Bottlenose Dolphins are usually a crowd favorite at Sea World and other aquatic exhibits. The ability to gaze intelligently into the eyes of a human has pulled on the heartstrings of

78 Hunt & Gray 2006b

79 Hunt & Gray 2006a

many. Work on dolphin intelligence and social learning tells us more about their similarities to humans. Dolphins, it has been pointed out, are "poorly adapted for manipulating objects."[80] However, there has been one exciting study of the manipulation of objects by dolphins that strongly suggests the cultural transmission of a novel hunting technique and the use of a tool.

A group of bottlenose dolphins in the wild, in Shark Bay, Western Australia, were found using marine sponges to forage.[81] This technique, known as 'sponging', is where a dolphin breaks off a piece of marine sponge to put over its nose; using the sponge over its nose, it stirs up sea floor to scrounge up fish.[82] Analyzing thirteen of fifteen dolphins found 'sponging' in Shark Bay, researchers analyzed the DNA of the dolphins to find that these dolphins, twelve of which were female, were related, and go on to suggest that all the dolphins found sponging had some common ancestor who came up with this behavior (the "Sponging Eve," according to the team).[83] The story for the popular media was entitled "Dolphin mums teach daughters to sponge."[84] Researchers studying these dolphins speak of 'sponging' as tool-use, and they rule out the genetic inheritance of this trait.[85] Rather, the researchers suggest that these dolphins pass this skill onto their young through social learning.[86] "Intense visual attention by offspring to the expert actions of

80 Tyack 2000

81 Krutzen et al. 2005

82 Krutzen et al. 2005

83 Krutzen et al. 2005

84 Sasskatoon 2005

85 Krutzen et al. 2005

86 Krutzen et al. 2005

their mothers" suggests that the dolphin calves are learning how to hunt from their parents, and studies in captivity confirm the capacity of dolphins to learn.[87]

This tool-use among dolphins is interesting, but there are other skills worth investigation. Dolphins have been found to vocalize whistles specific to individual dolphins.[88] 'Vocal matching' is an activity or learned ability whereby dolphins may imitate a signature whistle of a specific dolphin to "address that individual."[89] While whistles have been known to pick out individual humans by dolphins in captivity, this ability of 'vocal labeling' in the wild is very suggestive.[90] Bottlenose dolphins are known to be social creatures with a brain-body mass ratio higher than most other mammals (except for humans).[91] Dolphins live in groups, and pairs will often be seen together in the wild "continuously for 5 to 10 years."[92] Peter L. Tyack, lending perspective to the whistling research explains that

> Animals with strong individual-specific social relationship usually have a communication system that includes "signature" signals for recognition. Rather than producing specific vocal signatures [like dolphins do], many animals encode signature information though individually distinctive anatomical features. For example, primates have distinctive facial features

87 Krutzen et al. 2005

88 Janik 2000

89 Janik 2000, Tyack 2000

90 Janik 2000

91 Tyack 2000

92 Tyack 2000

> and have evolved perceptual mechanisms specialized for recognizing faces... This form of visual communication is not useful for marine mammals because visibility underwater is often limited to one body length.... so it is not surprising that marine mammals have evolved vocal signals for maintaining contact and for broadcasting individual identity.[93]

Dolphins have evolved skills different from us and specialized for their environments that permit a specialized way to identify one another. Studies on dolphin whistling point to a sophistication in terms of the encapsulation of knowledge through vocalizations. In addition to the eleven known foraging tactics of dolphins (sponging among them), vocal matching and labeling might be considered part of the knowledge of dolphins that might be candidates for the encapsulation of propositional content.[94]

In both bottlenose dolphin studies, researchers were careful to watch the dolphins to make sure that the behavior did not stem from some innate drive. In *The Extended Phenotype*, Richard Dawkins argues that some animal tools or techniques, like the web of a spider or the hills of ants, are, for all functional purposes, extentions of the animal's body, and can be considered part of them.[95] The web of a spider is part of the implementation of its phenotype in the world. Dawkins explains:

> … individual spiders have consistent idiosyncrasies which are repeated web after web…. [O]ur belief that spiders' webs have evolved their efficient shape through natural selection necessarily commits us to a belief

93 Tyack 2000

94 Krutzen et al. 2005, Tyack 2000

95 Dawkins 1982, page 198

> that, at least in the past, web variation must have been under genetic influence… From the viewpoint of this book an animal artifact, like any other phenotypic product whose variation is influence by a gene, can be regarded as a phenotypic tool by which that gene could potentially lever itself into the next generation.[96]

Researchers are worried that certain dolphin behaviors or techniques may be part of the dolphin's phenotypic genetic expression in the world, rather than the product of social and cultural transmission of knowledge. Those researchers interested in New Caledonian crows have also worried about this, but their observations have started to suggest that the mechanism of the transmission is not simply genetic.[97] The use of sponges among dolphins does not seem to be simply genetic either. For both dolphins and crows, the notion of shared material culture and the encapsulation of content seem to loom large in the literature, with researchers often referencing chimp and human studies as points of reference with which to take work on these animals and their relationship to human beings.

Section C. Material Culture and Propositional Content

In this last section of the chapter, I want to suggest a link between material culture and propositional content with intentionality. As philosophers, we often think of propositional content in terms of logical statements and analyses. Because of a certain "language bias" shared by philosophers, making sense of tool-use in the context of intentionality might

96 Dawkins 1982, page 199

97 Hunt and Gray 2006a, Hunt and Gray 2006b, Bluff et al. 2007

make little sense without further elaboration. In *Thing Knowledge*, Davis Baird argues for "a materialist conception of knowledge" where nonverbal creations encapsulate knowledge like propositions do.[98] While Baird's particular area of concern involves scientific instrumentation, what he says regarding the importance of material objects to knowledge and the encapsulation of propositional content is of relevance here.

Baird points to a 'text bias' for which philosophers have long been guilty. Philosophers, people who work with words, have often considered words of prime importance to knowledge, and, following that, philosophers of science often pointed to theories as being of primary importance to the scientific enterprise.[99] However, we can see how some instruments or devices aid in our thinking in ways words do not:

> Certain aspects of the relations between electricity and magnetism can be expressed in literary terms with words and equations. Other aspects can be expressed in material terms with wire, iron and wood. This was [Thomas] Davenport's way. Davenport was able to see relationships in the material terms in which they were presented in Henry's electromagnet. He could manipulate these relationships in his mind's eye and ultimately manually to make something new. He was not working with equations or propositions. He was working with materials.[100]

In other words, sometimes one produces knowledge that can more easily be expressed with materials, not words. This is true for humans. In the case of our New Caledonian

98 Baird 2004, page 1

99 Baird 2004

100Baird 2002

crows, the researchers pointed toward the crows' knowledge of 'folk physics,' and understanding of certain expected outcomes of action in the world. That "our material creations bear knowledge"[101] brings in a possibility that the tools of non-humans could bear knowledge in similar ways... *in designed ways that point to intentionality in tool-making and use.*

For Baird, the content encapsulated by instruments need not be propositional in nature. In fact, sometimes we will be unable to easily put into words what we can demonstrate through the creation of a material artifact. I want to use this idea in the realm of animal artifacts. It seems to me that the encapsulation of knowledge – or understanding, if one prefers – is part and parcel of what it means to make a tool and use it. The crows make and use tools effectively and in seemingly novel ways to extract different types of prey. The dolphins make their sponge-tools and teach the others how to use this technique to scrounge up food from the sea-floor. These artifacts seems to be the product of understanding the environment and what is required of it, just as our human artifacts – including language – point to our knowledge of the world.

Baird's project is very different from mine here. Baird takes the notion that knowledge involves "justified true belief" and replaces the 'belief' portion with the notion of function, which artifacts can have.[102] His notion of function he calls 'thin', untethered to intentional concerns.[103] Baird concedes that there is an element of intention in any human artifact:

101Baird 2004, page 170

102Baird 2002

103Baird 2002

> A function is a purposeful phenomenon. But adding purposes adds problems. There are problems ascertaining purposes or intentions. Without access to a designer's mind or a design team's interactions, determining the intention behind some part of an instrument can be a difficult matter of reconstruction and interpretation. [104]

When we look at the tool-use and tool-manufacture of crows and dolphins, we confront the same sorts of questions, as we cannot be sure of what goes on in the mind of a dolphin or a crow. We can only infer intentions from the use of their tools and techniques, but this is the same thing we would have to do when looking at what it is humans do with intentions, most especially humans in totally unfamiliar cultures deploying unfamiliar tools in unfamiliar contexts. However, we often infer intentional behavior from other humans without problem because we suppose their minds are sufficiently like ours. There is no similar reason to suppose crow minds and dolphin minds are sufficiently like ours (though much of the research on these creatures involves comparison with human intelligence, human brain-body mass ratios, etc.), but we should not avoid treating their behavior as significant, intentional, and exciting simply because of reservations we might have about treating the minds of other creatures. In fact, if we don't try to fit their behavior into models of intelligence and intentionality that we accord ourselves as humans, we fall into a trap of treating animal behavior as lesser just because we cannot fully understand what it is like to be a crow. We approach the subject unfairly if we cannot entertain the notion that these creatures have some faculties. When I say that I am after an unbiased account of intentionality, I mean just this: we have to allow for the

104Baird 2002

possibility of animal intentionality from the outset lest we determine their status *a priori.*

In the next chapter, I make the argument that at least some animal behavior should count as intentional by the definitions laid out in Chapter II. I try to do this in a fair and reasonable way that allows for the fact that animal behavior won't look the same as human behavior. Just as Baird shows us how knowledge content can be encapsulated in material artifacts, we can see how the knowledge crows have about the world form their vantage point may allow for a similar (intentional) encapsulation of knowledge. Though Baird would like to shirk away from intentionality, it must be met head on if we hope to make sense of what animal tool-use means.

Chapter IV: Intentional Animal Behavior

In the introduction to this paper, I set up the structure of the argument in the following fashion:

(P1) Philosopher X defines intentionality as Y.

(P2) Animal Z acts in a way that demonstrates Y.

(C) Y indicates intentionality, so Animal Z is a creature who has intentionality.

This chapter will fill out the X, Y, and Z's of this argument for several philosophical accounts of intentionality that were described in Chapter II. Specifically, I will make the above argument for Ruth Garrett Millikan's evolutionary account of intentionality, Matthew Hanser's account of intentionality with autonomous intentionality, the broad account of intentionality that Hanser describes, and the narrow account of intentionality that belongs to G.E.M Anscombe which was also discussed in the Hanser section. The accounts of intentionality that I chose to focus on for this thesis cross a wide-range of common views on the subject, and, for this reason, I use them. However, for any fair account of intentionality (one that does not set up standards that could be impossible even for some human beings), I think we can find cases where some of the behavior of non-human animals might be able to qualify as intentional beings.

Section A. Millikan's Evolutionary Intentionality

Millikan admits early on that intentionality is not a 'clean-cut phenomenon'. However, we can make sense of her account of intentionality, which she considers a paradigm rather than a definition. So, how do Millikan's intentional icons apply to the crow and dolphin cases described in Chapter III?

The first intentional icon is: "A sentence is a member of a reproductively established family [has] direct proper functions."[105] Here Millikan talks of imperative and indicative sentences and whether they may be considered to indicate intention. Millikan allows that bee dances fit into this first intentional icon. The making of hook-tools by New Caledonian crows might also suffice because there is a certain pattern and lineage to the design of individual hook-tools within a tool set. Furthermore, there are several types of tools that can be manufactured in this community which follow specific, well-followed patterns. As for proper function, types of hook-tools certainly have these. They can be directly inferred from observation of New Caledonian crows with the tools.

The second intentional icon is: "Normally a sentence stands midway between two cooperative devices, a producer device and an interpreter device, which are designed or standardized to fit one another, the presence and cooperation of each being a Normal condition for the proper performance of the other."[106] Here, we are faced with the question of whether the tools of crows stand between two crows to communicate information. This information is not clear from field studies of the crows. However, some research brings up the possibility of information being conveyed between younger crows and adult crows about proper shaping techniques, etc. Furthermore, the studies that

105 Millikan 1984, page 96

106 Millikan 1984, page 96-7

involve the dropping of nuts from specific places in trees onto rocks indicate a socially shared technique. So, it seems these crows can be wedged into intentional icon two. The case of the bottlenose dolphin whistling more easily fits this intentional icon; bottlenose dolphins use their personal whistles to convey information about their presence to each other and require all the sorts of things Millikan talks about as being important for the cooperation between the two 'devices'. Bee dances also count, according to Millikan, so she certainly sees the possibility of animal behaviors meeting the requirements of this icon.

The third intentional icon is explained thus: "Normally the sentence serves to adapt the cooperating interpreter device to conditions such that the proper functions of that device can be performed under those conditions."[107] Bee dances can also be explained in reference to this icon: bee dances work to adapt the interpreters to act in a directed way toward the proper location of nectar.[108] New Caledonian crow tool-use might also fit this category. The making of pandanus leaf tools of the New Caledonian crows might be taken as a sentence which serves to adapt the crow to conditions so that the (literal) device can be 'performed' – or better, 'used' – in the proper way under the proper conditions of pandanus leaf use, which involves prying for prey. But, one might object, this is not the usual way in which we take Millikan's 'devices'. Then, I would refer to the dolphin case. Bottlenose dolphin mothers who communicate through visual cues to their daughters the ways in which to use broken off pieces of sponge to scrounge for prey on the sea floor fit very well the third intentional icon, as does the bottlenose dolphin

107Millikan 1984, page 97

108Millikan 1984, page 98

whistle used to communicate presence so that others can act accordingly.

The fourth and last intentional icon is divided into two parts by Millikan. First, "In the case of imperative intentional icons, it is a proper function of the interpreter device, as adapted to the icon, to produce something onto which the icon will map in accordance with specific mapping function."[109] Also, "In the case of indicative intentional icons, the Normal explanation of how the icon adapts the interpreter device such that it can perform its proper functions makes reference to the fact that the icon maps onto something else in accordance with a specific mapping function."[110] The mapping of sentences onto the world becomes important here. For the imperative or indicative icons, interpreters produce something that can be mapped onto the world given to it by a mapping function, perhaps contained within the producer's communication. The case of dolphin whistling seems to count easily as an indicative icon; a dolphin imitates the whistle of another to "address that individual"[111] conveys a particular indication of information about something present in the environment, something easily mapped onto the world. But, non-human animals do not qualify merely for the indicative. Bottlenose dolphin social learning in the form of the teaching of sponging (and other foraging techniques) to youngsters also involves non-verbal imperatives in terms of what is to be done to appropriately achieve a goal in hunting. Crow tool-use involves an explicit mapping onto the world; tools are crafted because they fit properly into the world of the crow and its scavenging in crannies; environmental cues that communicate among the

109Millikan 1984, page 99

110Millikan 1984, page 99

111Janik 2000, Tyack 2000

crows “good” places to drop nuts to crack them open may also count as indicative here with proper reference to the world. Bee dances also qualify for this icon.

From the outset, Millikan considered the behavior of a non-human animal in her analysis, so the outcome of the animal studies upon her intentional paradigm should come out as no surprise. For the sake of formality, the argument can be made and followed through as follows:

(P1) Millikan defines intentionality through a four-part paradigm.

(P2) The behavior of Bottlenose dolphins and New Caledonian crows can meet every criterion set out in Millikan's four-part paradigm.

So, Bottlenose dolphins and New Caledonian crows are creatures who have intentionality.

While not as pretty as the X, Y, Z format, we can see that at least some animal behavior counts as intentional under the paradigm Millikan lends us. However, as mentioned in Chapter II, Millikan's account is not without its own problems. She seems to incorporate linguistic concerns without ever saying this is the case. I would argue that Millikan's intention icons, because of this linguistic reliance, are unfairly restrictive in dealing with animal intentionality. However, for the cases I have examined, it will suffice to say that Millikan's intentionality seems to allow for non-human animal intentionality of some types.

Section B. Hanser's Intentionality with Autonomous Teleology

Intentionality for Hanser means doing something with an end in mind, which is how philosophers typically take intentionality.[112] Hanser introduces the concept of autonomous teleology to help us better face some of the problems of other accounts. Autonomous teleology accounts for situations in which agents are acting for ends that are not their own. While Hanser's own account does not negate action done without the ends of others in mind, it is interesting to think of how animal intentionality might fit into this model. In the case of Bottlenose dolphins, we've seen cases where, through social learning, young dolphins are taught foraging techniques. It seems that the intentions of the parents here bear on the children, and, while the techniques are in the young dolphins' best interests and will serve them in future goal-directed behaviors, the young calves would seem to be following the parents' set of intentions or end-goals. Additionally, in the case of the use of sponging techniques, we might be able to say that the dolphins use the technique to scrounge up prey, prey that is used toward the goals of dolphins. On Hanser's in-between account, it seems like we can still fit at least some non-human animal activity into the model.

(P1) Hanser defines intentionality as goal-directed behavior that can involve the borrowing or lending of another's intentions.

(P2) Dolphins act in a way that demonstrates the ability to borrow another's intentions or force another into borrowing one's own intentions.

(C) Bottlenose dolphins are creatures who have intentionality, even of the complex type Hanser describes.

112Hanser 1998

Though I have no field case for autonomous teleology on the part of New Caledonian crows, we can see how the behaviors described in Chapter III can easily fit into goal-directed. The shaping of tools involves an end-goal; the laboratory studies help boost this claim.

Section C. The Broad Account of Intentionality

The broad account of intentionality, as Hanser describes it, involves performing an action that can be foreseen.[113] This account is so broad that it is the easiest to make a case for non-human animal intentionality under it. New Caledonian crows do not shape twigs to a certain form for no reason; rather, it seems that the crows craft tools for purposeful reasons. Additionally, cracking nuts open on rock using a particular, tested technique also seems like an action done with foresight on the part of the crow.

(P1) Some philosophers define intentionality something done with foresight.

(P2) New Caledonian crows act in ways that demonstrates foresight.

(C) Foresight indicates intentionality, so New Caledonian crows are creatures who have intentionality.

A similar case can be made equally well for our friends the Bottlenose dolphins, whose learning of 'tricks' in captivity makes this argument even more strong. We really do not need to say more to meet the requirements of those philosophers in the broad account camp.

113Hanser 1998, page 381

Section D. The Narrow Account of Intentionality (of which Anscombe's is one)

Hanser helps characterize the account of intentionality that we find in the work of G.E.M. Anscombe and in those accounts influenced by her as "narrow" in that they involve internal deliberation over steps to meet an end-goal.[114] Intentions must be very specific for "narrow" accounts. Anscombe herself has something to say regarding "brutes":

> Intention appears to be something that we can express, but which brutes (which e.g., Do not give orders) can *have*, though lacking any distinct expression of intention. For a cat's movements in stalking a bird are hardly to be called an expression of intention. One might as well call a car's stalling the *expression* of its being about to stop.[115]

For Anscombe, expressions of intention must be strict expressions, or "strict and narrow" in Hanser's language.[116] Anscombe suggests that actions which take an intentional form are actions to which the question "Why?" would have a direct answer.[117] While we cannot fairly ask crows and dolphins why they do what they do, we can see through field studies the ways in which tools are used toward specific goals. In this case, the tool-use examples are particularly fitting, but interpreting the calls of birds and movements of dolphins could be tricky. However, lab studies have shown that New Caledonian crows presented with new materials have been able to bend and unbend wire to appropriate lengths to

114Hanser 1998; Anscombe 1957

115Anscombe 1957, page 5

116Anscombe 1957, Hanser 1998

117Anscombe 1957, page 9

accomplish tasks.[118] So, there seems to be something in the way of judgment and goal-direction to be going on in the tool-related behaviors of these crows.

As for the Bottlenose dolphins, their social learning and foraging techniques speak to a very clear answer to some 'why'-questions about what it is they are trying to do. Novel, socially shared, and learned foraging techniques indicate that these behaviors are not simply the product of an extended phenotype being implemented in the world. Furthermore, their social learning and great intelligence should indicate that their responses will be more complex and less purely instinctual than that of many other creatures. Our discussion of dolphins in Chapter III helps support a conclusion that dolphins have intentionality, even by Anscombe's narrow account.

(P1) Anscombe defines intentionality as something done for which the question “Why?” would have a clear answer.

(P2) Bottlenose dolphins act in ways that allow us to propose answers to “Why?” when they come up with new hunting techniques.

(C) Bottlenose dolphins are creatures who have intentionality.

By all the accounts at which we've looked in this chapter, we can conclude that at least some non-human animal behavior falls into the category 'intentional.' Some animal behavior have the “aboutness” which most philosophers associate with intentions.

118 Bluff et al. 2007

Chapter V: Further Considerations

In this last chapter, I justify some of what I imagine to be the less popular moves I have made, and then reflect on the further implications of work of this sort. I've attempted to demonstrate how some animal behaviors seem to be intentional by non-linguistic philosophical standards by borrowing new concepts emerging out of epistemology of technology. One can too easily imagine objections to this work based on critiques of anthropomorphization on the part of researchers, based on the affirmation linguistic standards for intentionality, and based on objections to the new concepts I have borrowed from philosophy of technology. In the first part of this chapter, I would like to argue in favor of approaching this topic in the way I have by defending my methods. We have good reason to reject linguistic standards of intentionality, and we have good reason to think that philosophy of technology might help approach animal intentionality. And, indeed, we have reasonable grounds on which to be interested in animal intentionality without falling prey to improper anthropomorphization of our subject; we should be able to look at animal behavior as much as we look to human behavior to infer the intentionality of other humans, but we must be more careful to attend to environment and context.

Section A. Anthropomorphizing Animal Behavior

Anthropomorphizing means to attribute human characteristics to non-human animals or objects. We can think of people who name their cars or beg to their computers (probably

running Windows) not to crash as anthropomorphizing in an improper manner: that car is not going to talk back and the computer probably won't respond to your voice (unless one has talk-to-type software or Skype, and then you aren't anthropomorphizing). Researchers working with animals are sometimes accused of anthropomorphizing their subjects; they can sometimes unfairly attribute human-like responses that are simply not human-like.

In order to avoid this accusation upon this work, I have tried to rely heavily upon field studies done in the animal's own environment so that the intentions of humans do not play into the behaviors of animals. The observations of bird and dolphin behavior that I've drawn upon report the goings-on of these animals in terms of social and tool-making behaviors (and rituals for those behaviors observed repeatedly). These studies have carefully investigated possible biological causes for behaviors that could be incorrectly categorized as intentional. However, in the studies I've provided, researchers have come to conclusions that the behaviors cannot be attributed to a simple biological cause, at least in the case of the dolphin.

To at least the extent that we can talk about animal culture and social learning, we should also be able to talk about animal intentionality. We really never actually know the minds of any other creature experientially, including humans, but we infer that other humans have the same feelings of mental content and goal-direction that we experience. Some animals deserve the same inference, as their behavior appears to demonstrate mental content and goal-direction, the "aboutness" which we seek. We have found that some non-human animals do work with a stimulus-response or deeply instinctual

structure to their minds; one never sees a spider decide to spin a web differently: the design of the web does not seem to be the choice of the spider. However, we have no reason to make a generalization about all non-human animals from the fact that some animals do act with intentioned behavior. There is no reason to expect that we should be able to describe animal behavior as a unitary thing. This thesis does not fall into the trap of an improper anthropomorphization because the arguments I have given here attempt to get at the underlying intention behind language, tool-making, and other behaviors that indicate intentional behavior within in the animal's own context and environment.

Section B. A Defense Against Language

Language helps shape, organize, and relate the contents of our (human) minds. It is hard to think of how there might be another way in which to formulate our ideas or formulate intentions without having some content of which we can think about. Linguistic accounts of intentionality can very well help us to understand human thought and its communication. However, if we insist upon the linguistic as the only standard for intentionality, we rule out the possibility of non-human intentionality *a priori*, and there seems no good reason to do this. Language, a useful social convention and tool, can help us describe the 'aboutness' of that which we are thinking, but we can think without language. One can hardly say that deaf children cannot intend because they lack the proper linguistic framework. If we insist on a linguistic framework from which to view intentionality, we rule out some humans as intentional beings as well, an undesirable move.

While some proponents of linguistic views will not be compelled to change, I would argue that these proponents are simply not allowing for the differences in environment and mental content that many non-human animals have compared with our environments. We should not expect the intentions of a crow to be articulated in the way we humans articulate our intentions. Expecting this 'rigs the deck' from the beginning.

Christopher Preston tells us that: "knowledge claims are readily given a social location in terms of gender, race, class, theoretical and cultural context, but they are rarely given a physical location in a particular geographical or material environment. This unfortunately has left a residual anthropocentrism in epistemology… Nothing physical in the epistemic agent's environmental context is seen to count."[119] We can say a similar thing about intention. We are quick to describe intentions in terms of individuals and their circumstances, but physical environment (internal and external) will matter to the composition of intention in intentional agents. We should not expect the intentions of a crow or dolphin to be expressed in a way identical to human beings, so language need not be the cornerstone of an intentional account for other animals.

A better way to see language as a part of intentionality is to give it a role in demonstrating intentionality. When we can communicate what our ideas are 'about', then we effectively demonstrate our intentions. In the case of humans, we can explain something to someone else and show that we are intentional beings. In the case of non-human animals, this process is complicated by the communication process. However, we can see the demonstration of intention in the creation of artifacts, the cultural mechanisms, and social lives of animals, and then we can rule out those behaviors as

119 Preston 2005

phenotypic or biologically-ingrained responses to make sure that our analysis is accurate. I've used here an approach based on the idea of the knowledge encapsulation of objects. While we cannot know what is in the mind of another human, we can certainly get a look by, say, checking out a motor. Another human understood something about the world in order to make that motor, and, while we might not be able to articulate those concepts, they can be plainly seen. In the same way, we can regard the making of things by animals as a signpost of intention after we rule out the behavior as part of their 'extended phenotypes' – in other words, if we see cultural transmission or innovation as part of the tool-related behaviors, we can say that something intentional seems to be going on.

Section C. An Affirmation of Material Epistemology

One of my assumptions in this project has been that material things can point us to intentional mental content. As the role of scientific instruments has been highlighted by philosophers and historians, they have had to attend to an explanation of knowledge and truth within this context.[120] Davis Baird is willing to put aside the notion of knowledge as 'justified true belief' by replacing belief with function for our material creations, but even this presents its problems:

> A function is a purposeful phenomenon. But adding purposes adds problems. There are problems ascertaining purposes or intentions. Without access to a designer's mind or a design team's interactions, determining the intention behind some part of an instrument can be a difficult matter of

120 Baird 2004; Galison 1997; Hacking 1983

> reconstruction and interpretation.[121]

Baird tries to employ a 'thin' notion of function, unburdened by the intentional content:

> I acknowledge that at some level in some way functions are connected with intentions. But I sidestep a detailed analysis…. Here I am content to argue that knowledge is borne in our artifacts, and to thereby provide an epistemological justification for a more detailed analysis of a thicker, more fully intentional, notion of function.[122]

Here, it seems, Baird allows for made artifacts to involve intentions. Artifacts help catapult our ideas, our knowledge, the things we think about, into the world. Made objects can help demonstrate our knowledge about the world and our intentions upon it. If this is true for us humans, there seems to be no reason not to look at the artifacts of non-humans and their use to see what it might be that they have in mind, to see whether intentional thought is being used to shape materials to be used to navigate an environment.

Language itself is often referred to as a tool; it would be very odd indeed to value only one sort of tool, language, in judging whether a creature has intentions. Rather, by looking at a larger set of created things, we can see how easily creatures that make and use tools might be counted as intentional beings. The move to bring philosophy of technology into discussions of intentionality seems appropriate since language has already been a central part of the discussion. By broadening what it is we can look at to indicate intentional behavior, we can better assess the intentionality of non-human

121 Baird 2002

122 Ibid.

animals.

Section D. Implications & Reflections

I've argued here that at least some animals have intentions by looking at tool-*use* as one lens through which to approach the subject. There may be other ways in which to try to find out whether animals have intentions, but looking at tool-use suffices to allow at least a few animals into the category 'intentional beings'. I see this work as part of a much larger project to reconcile what we know from animal studies with our notions of technology. By looking at animal studies, we can make more careful distinctions that are useful to our epistemological and ethical projects. Though we will arrive at a more complex picture of reason, knowledge, intention, truth, and action, the hope is that this picture will also be more accurate in describing what it is we (and other species) actually do and how we act in the world. Certainly, this thesis is only a very small start in complicating the story of intention. It can serve to show one way in which we might start to pursue animal studies in the face of one of these big philosophical monsters.

Non-human studies (this includes AI along with animal studies) have already played an invigorating role in philosophy of mind, utilitarianism, and environmentalism (to name just a few areas). However, when it comes to philosophy of action, meaning, and technology, very little has been done to really place non-human studies within the central questions facing these areas of study. In using non-human studies to enrich our concepts and understanding, we have to be sensitive to environment and context. We can't simply take human beings to be special or elevated simply because we have traditionally

put ourselves in that role. Using human standards to judge animal behavior simply will not do. Rather, if we hope to make sense of animal studies in the context of our philosophical projects, we have to be careful in our descriptions and the way in which we pursue the divisions and differences we draw. In this thesis, I set out only to show that at least some animals have intentions, but, if I hoped to construct a more nuanced account of which animals do and do not have intentionality, the situation would be much more difficult. Making absolute claims with evidence of incredible variety will be incredibly difficult. The title of this thesis is "What Dolphins Want: Animal Intentionality and Tool-Use." While I still cannot speak to what it is dolphins want, I hope that I've demonstrated that a look at tool-use can help us make sense of the possibility of intentionality on the part of some animals.

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