# Chapter 10
# Heuristic Evolutionary Psychology*

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## 10.1 Introduction

As is widely known, evolutionary psychologists claim that appealing to the mind as an evolved, biological organ is immensely useful for bringing the science of psychology forward. In particular, they think that important discoveries about how our minds work can be especially easily made once we consider the issue from an evolutionary biological point of view: this perspective is said to bring considerations into view that psychologists would otherwise have missed (see e.g. Pinker, 1997; Cosmides & Tooby, 1992; Carruthers, 2006).

However, from the moment of its inception, this kind of approach towards doing psychology has also not been without its critics. In particular, evolutionary psychology has frequently been accused of resting on nothing but (adaptationist) just-so story telling. More specifically, many critics of the program have claimed that the evolutionary hypotheses considered by these researchers are completely evidentially ungrounded, and therefore amount to nothing more than unconvincing speculation. For this reason, the scientific credentials of the program are often put into doubt: far from widening and systematising debates about the structure of our minds, evolutionary psychology seems rather to narrow and confuse them (see e.g. Richardson, 2007; Buller, 2005; Dupré, 2001; see also Kitcher, 1985, pp. 9-10).

In order to respond to this criticism, evolutionary psychologists have two major options open to them. Firstly, they can claim that the criticism rests on a false presupposition. Specifically, they can argue that, by and large, they *do* have the required evidence for the hypotheses they are considering. For this reason, they should not be

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accused of providing nothing but unscientific speculations – their approach does not differ substantially from other (reasonable) applications of evolutionary theory (see e.g. Pinker & Bloom, 1990; Cosmides & Tooby, 1992; 2005). Secondly, they can claim that the above criticism is subject to a fundamental misunderstanding of their program: they use the evolutionary perspective merely as a *heuristic device* (see e.g. Machery, forthcoming; Samuels et al. 2004; Shapiro & Epstein, 1998; Buss et al., 1998, p. 545; Andrews et al., 2002, p. 538). For this reason, their use of evolutionary theory is not in need of evidential backing – heuristic devices have the goal of *leading to* evidence for some theory; they themselves, though, do not need to be evidentially supported.

It is this second response that I want to consider further here. The main reason for this is that, as it stands, it is insufficiently well supported. In particular, no concrete cases have been presented that clearly bring out the ways in which evolutionary theory has been used in a purely heuristic way in psychology (see also Davies, 2002). Presenting such cases, though, is necessary, since the accusation that evolutionary psychology is evidentially ungrounded concerns *currently practiced*, *actual* evolutionary psychology – not some *merely possible*, *fictional* evolutionary psychology.

For this reason, I here present arguments for two conclusions. Firstly, I try to show that the typical ('high church') examples of evolutionary psychological research in fact do *not* fit to a heuristic reading of the program. Secondly, though, I also aim to show that there are cases that *do* fit such a reading – however, there are not very many of them, and it is far from straightforward to find them. In this way, I hope to make clear that the heuristic defence of evolutionary psychology is not entirely unconvincing – but also that it is far less often applicable than is supposed by many philosophers and psychologists (see e.g. Machery, forthcoming; Samuels et al. 2004; Andrews et al., 2002).

Before presenting these arguments in more detail, it is useful to make a brief remark about how the term 'evolutionary psychology' is to be understood here. In general, there are two different ways of using this term: a narrow and a wide one.[1] According to the narrow usage, 'evolutionary psychology' refers just to the 'Santa Barbara' school of evolutionary psychologists – comprising primarily Leda Cosmides, John Tooby, David Buss, Robert Trivers, Martin Daly, and Margo Wilson (see e.g. Buller, 2005; see also Richardson, 2007; Sterelny, 2003, chap. 6). According to the wide usage, 'evolutionary psychology' refers to evolutionary approaches to the mind generally, independently of any specific doctrines that particular evolutionary psychologists might choose to defend. As will also become clearer below, I here always use the term in the latter, wide sense: the issue is whether the introduction of evolutionary theory into psychology *in general* can be defended from a heuristic point of view, not whether specific theories of specific evolutionary psychologists can be defended in this way (see also Carruthers, 2006, p. 36; Machery, forthcoming).

[1] Buller (2005) calls these two understandings of evolutionary psychology 'EP' and 'ep' respectively.

The paper is structured as follows. In section 10.2, I briefly make clear how to determine when evolutionary theory is applied in a genuinely heuristic way, and when not. In section 10.3, I use the results of the previous section to show that most of the standard examples of evolutionary psychology do *not* employ evolutionary theory in a heuristic manner. In section 10.4, I similarly show that Gergely & Csibra's work on the psychology of human pedagogy *does* exemplify a heuristic form of evolutionary psychology. I conclude in section 10.5.

## 10.2 Evolutionary Theory as an Explanatory and Heuristic Tool

In order to determine whether evolutionary psychology can really be defended from a heuristic point of view, it is necessary to begin by making clearer what it means, more generally, to use evolutionary theory in a heuristic way. In turn, this requires us to get clearer on what the relevant non-heuristic uses of evolutionary theory are: what is the contrast class to which heuristic applications of the evolutionary perspective are meant to be compared?

Now, in the present context, it seems clear that the major alternative to a heuristic use of evolutionary theory is an *explanatory* (or evidential) use.[2] At least on the face of it, when evolutionary theory is not used in a heuristic way, it is used to give an account of why certain things happened in the way they did – i.e. it is meant to *explain* a set of facts. In more detail, this explanatory use of the theory can be described as follows.

Explanatory applications of evolutionary theory (as of any other theory) aim to help us account for phenomena that are already known to exist: they try to determine what caused some phenomenon to come about, or what led to it having the particular features it actually has, or some such. Of course, for this to be possible, the phenomenon at issue needs to be (somewhat) well understood to begin with: in particular, we at least need to know *that* it exists and what (some of) its *features* are – for it is this existence and these features that are at the heart of the explanatory project. In this kind of case, therefore, knowledge of the phenomenon comes first, and the appeal to evolutionary theory comes later: here, the theory tracks the data, and not the other way around.[3]

This is very different when it comes to *heuristic* uses of evolutionary theory, however. There, the theory aims to make helpful suggestions about which issues are worth exploring further – i.e. it points to some overlooked phenomena that it would be good to know more about. Trivially, for this to be at all compelling, these

[2]Note that there may also be uses of evolutionary theory that are not well classified as being either of the explanatory or the heuristic sort (e.g. when it comes to the testing of the truth of evolutionary theory itself). However, for present purposes, maintaining the dichotomy in the text is sufficient.

[3]Note that the reason the theory cites for why the phenomenon of interest came about need not be the true reason – for all we know, the application of the theory might be mistaken in various ways. The point here is just that this kind of application at least *aims* at truth.

phenomena must neither be already known, nor must they be inherently uninteresting: for a heuristic application of evolutionary theory to be truly fruitful, it needs to suggest phenomena that we had no idea existed, and which are of major theoretical concern to us. In this kind of case, therefore, the application of the theory comes first, and the knowledge of the phenomenon comes later – here, the data track the theory, and not the other way around.

In order to understand this heuristic application of evolutionary theory better, it is further important to note that there are two very different interpretations of it. Firstly, this kind of application could be read in an *expressive* way: on this reading, the claim that evolutionary theory suggests interesting phenomena to investigate is to be seen to refer to the way in which evolutionary psychologists express themselves in their work – it is a claim about what these evolutionary psychologists point to when they describe the origins of their studies. Secondly, this kind of application could be read in a *structural* way: on this reading, the claim that evolutionary theory suggests interesting phenomena to investigate is to be seen to refer to the most compelling way in which the relationship between evolutionary theory and the phenomenon at issue can be characterised – it is a claim about how the receipt of the relevant data is *best* accounted for, independently of whether this agrees with the evolutionary psychologists' own assessment of the situation.[4]

Now, for present purposes, it is only this second, structural reading that is relevant. Primarily, this is because the question at stake is whether evolutionary psychologists are *justified* in claiming that evolutionary theory can be used in a heuristic way in psychology – and not just whether they *do*, in fact, claim this. This is important, as it immediately makes clear that finding out exactly what various evolutionary psychologists are saying about their research is not sufficient to determine whether a plausible heuristic form of evolutionary psychology exists: for all we know, these evolutionary psychologists may be *wrong* about the role that evolutionary theory plays in their theory – after all, their expertise is in the study of the mind, not in the analysis of research programs. For this reason, the expressed opinions of evolutionary psychologists can, at best, make for *evidence* about whether a plausible heuristic form evolutionary psychology exists – by themselves, though, these opinions cannot *answer* this question. Hence, the expressive reading of heuristic uses of evolutionary theory can be left aside in what follows – only the *structural* reading matters here.

With this clarification in the background, the distinction between heuristic and non-heuristic (explanatory) applications of evolutionary theory can be summarised as

[4]Note that this structural understanding of heuristic evolutionary psychology should be distinguished from a purely psychological one: in the latter case, the goal is to uncover *the exact psychological processes* that led particular researchers to engage in the kinds of activities they did engage in. However, this purely psychological project is not so interesting here, since, for a general defence of the plausibility of heuristic evolutionary psychology, it is not necessary to determine *exactly* how the consideration of evolutionary theory has led some particular researcher to do one experiment rather than another. All that needs to be shown here is that it is plausible that evolutionary theory *somehow* played a crucial role in this – however, exactly, it did so.

follows. Assume that there is some set of empirical findings *E* (e.g. an experimentally or naturally occurring phenomenon), and some application of evolutionary theory *A*. Then *A* is a *heuristic* application of evolutionary theory vis-a-vis *E* if

(H) *A* gives rise to the discovery of *E*.

This is in contrast to *A* being an *explanatory* application of evolutionary theory vis-a-vis *E*, in which case

(X) *A* specifies a reason for the occurrence of *E*.

A few aspects of this distinction between (H) and (X) are usefully clarified here. Firstly, both (H) and (X) are very abstract, and leave a number of questions open. In particular, they do not specify in detail what it takes for the application of some theory to be a cause for the discovery of some set of experimental findings, as opposed to specifying a reason for the occurrence of the latter. Fortunately though, for present purposes, these kinds of questions can be left open: even though it might not be entirely clear how the distinction between causes for the discovery of E and reasons for the occurrence of E can be characterised in general, it seems clear that there is some such distinction, and that we can often recognise it fairly easily. Nothing else is needed here.

Secondly, it is important to note that (H) and (X) relativise the heuristic uses of evolutionary theory to a specific area – namely the set of empirical findings *E* in question. This is important to note, as otherwise, the two criteria would be trivial: it seems clear that for almost any theory – evolutionary theory included – there will be fruitful heuristic applications for *some* E (i.e. in *some* experimental context). The point at stake, though, is to determine whether evolutionary theory has heuristic applications for a *given* E – i.e. in a *given, fixed experimental context*.

Thirdly and relatedly, note that (H) and (X) are not necessarily mutually exclusive. In particular, it is plausible that many explanatory uses of a theory have heuristic effects; equally, it is plausible that many heuristic applications of a theory *also* turn out to be explanations of the phenomena they help to discover. However, this does not mean that the two criteria collapse into each other – just because some application of a theory can satisfy both (H) and (X) (for the same or different *E*'s), this does not mean that, in general, there is no difference in how the theory is used in the two situations.

Fourthly and finally, it is important not to conflate the *testing* of the explanation offered by (X) with a heuristic application of evolutionary theory in the vein of (H). *Any* testable explanation suggests further issues to investigate – namely, all those that help determine whether the explanation is true. However, this is an extremely weak and uninteresting sense of being a heuristic device, which ultimately reduces to being a compelling explanation. In the present context, more is looked for than that: what is at stake is whether evolutionary theory can plausibly be said to be used as a heuristic device *over and above* its providing possible testable explanations of some psychological phenomenon – for only this would make for a cogent heuristic-based defence against the criticism that evolutionary psychology is evidentially unconvincing. This will become important again below.

Given (H) and (X), it is now possible to consider whether there really are heuristic applications of evolutionary theory in psychology – and thus, whether the heuristic interpretation of evolutionary psychology can be made plausible. In order to do this, I lay out two (representative) examples of this kind of research – Cosmides & Tooby's work on *cheater detection* and Gergely & Csibra's work on *natural pedagogy* – and assess the extent to which they exemplify applications of evolutionary theory of type (H). Note that the goal in discussing these research programs is not to determine whether they are to be seen as successful or as yielding true conclusions; instead, the aim is merely to assess whether the they give clear support to a *heuristic reading* of evolutionary psychology. Accordingly, I shall not present or discuss in detail any criticisms that have been or could be made of these projects, and simply consider them as they stand.

## 10.3 Cheater Detection and Heuristic Evolutionary Psychology

In order to determine whether Cosmides & Tooby's work can be used as a basis for a defence of a heuristic form of evolutionary psychology, I proceed in two steps. Firstly, I lay out their research in as neutral and faithful a manner as possible. Secondly, I assess this research using the tools developed in the previous section. Consider these two steps in turn.

### *10.3.1 Cosmides and Tooby on Cheater Detection*

Cosmides & Tooby begin their research by drawing attention to two sets of social psychological findings, established using the classic Wason Selection Task (see Wason, 1966).[5] Firstly, human subjects often do not do well when it comes to assessing the truth of various conditional statements (see e.g., Wason, 1983; Cosmides, 1985). For example, when trying to assess whether the statement 'If a card has a vowel on one side, it has an even number on the other' is true (concerning a particular set of cards), people tend to want to ascertain whether cards that have a vowel on one side have an even number on the other *and* whether cards that have an even number on one side have a vowel on the other – even though the latter conjunct could not possibly falsify the above conditional (see e.g. Cosmides & Tooby, 1989).

Secondly and in contrast to the above, though, other studies have shown that people can also be quite *good* at assessing the truth of a conditional statement (see e.g. Johnson-Laird, 1982; Cosmides, 1985). For example, when asked to

[5]The Wason Selection Task consists in presenting subjects with a set of two-sided cards (typically four) and then asking them to point to the cards they think *must* be turned over in order to evaluate the truth of some statement (typically a conditional) concerning these cards.

assess whether the statement 'If a person is drinking beer, then they must be over 21 years old' is true (concerning a set of people in a bar), people quickly and correctly seek to ascertain how old the beer drinkers are and what the *under* 21-years olds – not the *over* 21-year olds – are drinking (see e.g. Cosmides & Tooby, 1989).

Cosmides & Tooby have found this difference in reasoning ability to persist under many varieties of the above two conditionals. In fact, they (claim to have) noticed that the only aspect of the situation that reliably predicted subjects' success at solving the Wason Selection Task was whether the content of the conditional concerned the violation of a convention of social exchange (see e.g. Cosmides & Tooby, 2005, 1992b). That is, Cosmides & Tooby found that people tended to do well when their task was to assess whether someone cheated in a social exchange, but badly when their task was to assess conditionals about other topics (for more on this, see e.g. Cosmides & Tooby, 1992b; for a critical view, see e.g. Buller et al., 2005; for some replies, see Cosmides & Tooby, 2008).

Crucially, Cosmides & Tooby then went on to claim that this improved performance is not surprising when looked at from an evolutionary point of view. In particular, they argue that, given the great importance of the social environment in our evolutionary history, we are likely to have evolved adaptations for dealing with other people. Specifically, Cosmides & Tooby argue that we needed to find a way to solve the *free-rider problem*: since individuals that take advantage of a social arrangement without paying the cost for maintaining it can make this kind of arrangement unstable, a way needs to be found to prevent cheating. To do *that*, though, it needs to be possible to *identify* the cheaters – for only then can they be prevented from or punished for any possible free-riding (Cosmides & Tooby, 1992b).

Accordingly, Cosmides & Tooby further argue that it is plausible to think that we have evolved cognitive adaptations that make exactly this possible. Specifically, they claim that we are likely to possess a 'cheater detection module': a mental mechanism that is attuned to the occurrence of social exchanges, and which allows us to determine the circumstances in which the conventions governing these are violated (see e.g. Cosmides & Tooby, 1992b). In contrast to this, they think that we did *not* have to evolve adaptations for reasoning with conditionals *in general*: since solving general logic problems was not part of our 'environment of evolutionary adaptedness' (EEA), there was no need to evolve a general 'logical reasoning module'. Finally, Cosmides & Tooby claim that, together, these facts account for the above effect difference in our ability to evaluate the truth of conditional statements: this difference is the result of the existence of specific adaptations for dealing with situations of social exchange, but none for dealing with conditionals in general (see e.g. Cosmides & Tooby, 1989).

### *10.3.2 The Place of Evolutionary Theory in Cosmides and Tooby's Research*

For present purposes, what is most important about this summary of Cosmides & Tooby's research is that it quite clearly shows that evolutionary theory is here

applied mostly in an *explanatory*, and not in a *heuristic* way. To see this, note that the key social psychological effect difference to be accounted for had *already been known* when Cosmides & Tooby put their evolutionary hypotheses forward: the difference in the success rates in evaluating the two kinds of conditionals was the *starting point* of their evolutionary investigation – and not an end state (this comes out particularly clearly in Cosmides, 1985, but any of their other publications supports this reading, too). Given (H) and (X) from section 10.2, this therefore makes clear that evolutionary theory is here being used in an explanatory way: it is best understood as putting forward a possible reason for the occurrence of these differences – not as a tool that led to their discovery.

In slightly more detail, the above analysis of Cosmides & Tooby's research shows that they should not be seen as having started by defending the proposition that humans in the EEA needed to have specialised cognitive tools for the detection of cheaters, and then using the Wason selection task to determine whether there really are traits of this sort. Instead, they should be seen as having *started* with the puzzling results of the Wason Selection Task, and then seeking to find an evolutionary reason that might *explain* these results (see e.g. Cosmides, 1985). Because of this, it seems clear that this case does not support a heuristic interpretation of evolutionary psychology – it quite simply does not exemplify any heuristic application of evolutionary theory at all.

Now, at this point, the following three objections to this conclusion might come to mind. Firstly, one might think that this conclusion underestimates the importance of Cosmides & Tooby's evolutionary perspective for *organising and sorting* the findings from the Wason Selection Task (see e.g. Samuels et al., 2004). Before Cosmides & Tooby's evolutionary work, these findings were hard to interpret and were generally seen to present a major psychological conundrum (see e.g. Cosmides, 1985, and the references therein). What Cosmides & Tooby did was to clarify how these findings hang together, and show how they can consistently be made sense of. For this reason, it may seem that there is a legitimate and defensible heuristic use of the evolutionary perspective here after all: the application of evolutionary theory guided us in understanding the relevant empirical findings better (see also Samuels et al., 2004).

However, while plausible on the surface, this objection does not in fact address issues of relevance in the present context. In the main, this is because the clarificatory use of evolutionary theory it appeals to is actually an instance of (X), and not of (H). This comes out most clearly from noting that Cosmides & Tooby's evolutionary hypothesis clarifies the interpretation of the divergent findings of the Wason Selection Task only to the extent that it is *true*. In particular, if it were to turn out that some other factor determines why people do better at evaluating certain conditionals than others (as has been claimed, e.g., by Buller, 2005, pp. 173-177), Cosmides & Tooby's way of grouping the above findings would actually be *misleading*. By criterion (X), therefore, this truth-focus makes clear that the evolutionary perspective here purports to present an *explanation* of how the findings of the Wason Selection Task are to be organised, and does not aim to *suggest* phenomena that we might otherwise have overlooked.

Secondly, one might object to the above argument by suggesting that the evolutionary perspective points to *further phenomena* that surround the detection of cheaters – and that it therefore *is* used in a heuristic way here (see also Cosmides & Tooby, 1992). For example, it might be argued that it is only because of Cosmides & Tooby's appeal to the evolutionary perspective that we found out about how well people can reason about unfamiliar situations involving social arrangements and about 'switched' social exchange conditionals.[6] Since the results of these findings were unsuspected, we might thus be said to have gained a better understanding of our minds – something that we would otherwise have been missing out on. In this way, it might seem like the evolutionary perspective is in fact used in a heuristic manner here.

However, this is not a compelling response to the above argument either. In the main, this is because the heuristic use of evolutionary theory it identifies is, at best, highly limited: it only concerns various *subsidiary findings*, but leaves all the main results of Cosmides & Tooby's work out of the picture. This comes out particularly clearly from noting that these findings are not particularly groundbreaking in and of themselves: for example, while certainly somewhat interesting, finding out how people reason about 'switched' social exchange conditional is not something we are interested in for its own sake – especially when compared to Cosmides & Tooby's main result (namely, that we can explain the puzzling findings of the Wason Selection Task by positing the existence of a cheater detection module). For this reason, it is better to see these findings as interesting mostly for their use as possible *tests* of Cosmides & Tooby's evolutionary hypotheses.[7] However, if this is granted, the above objection loses most of its force, since, as noted in section 10.2, this sort of application of evolutionary theory is not sufficiently strong to mount a compelling defence of heuristic evolutionary psychology: it is then better seen as an extension of an application of type (X), and not as an instance of type (H).

Thirdly, one might argue that the appeal to evolutionary theory was instrumental in helping Cosmides & Tooby think of *hypotheses* that might explain the data. That is, it might be claimed that the importance of the evolutionary considerations in the present context comes precisely from the fact that they suggest hypotheses that *could* account for the phenomena being made: these considerations make clear that a possible explanation of the above data can be found in the (supposed) fact that humans have evolved a mental module for detecting cheaters. Since the suggestion of hypotheses that *might* explain a phenomenon is not the same as *actually*

[6]Switched social exchange conditionals are conditionals where antecedent and consequent are switched – thus altering their truth conditions – but which are still meant to express the same social arrangement (e.g. 'If you give me your watch, I give you $20' is switched to 'If I give you $20, you give me your watch'). Interpreting these switched conditionals is very difficult, though, and not so relevant for present purposes (for more on this, see Cosmides & Tooby, 1992, 2005; Buller, 2005, pp. 183-188).

[7]Note also that this is precisely how Cosmides & Tooby themselves seem to understand the relevance of these findings – see e.g. Cosmides & Tooby (1992b). See also Buller (2005, pp. 183-185).

*explaining* that phenomenon, this might be seen to point to a defensible heuristic use of the evolutionary perspective after all.[8]

However, this objection, too, fails to be compelling. Virtually every theory will generate *possible* explanations for virtually every phenomenon one might care to mention. For example, a quantum field theoretic perspective suggests that the findings from the Wason Selection Task *may* be explicable using the interactions of fluctuating numbers of electrons and protons; a chemical perspective suggests that the findings *may* be explicable using the reactive properties of various kinds of molecules; and a Marxist perspective suggests that the findings *may* be explicable as showing that the bourgeoisie has found yet another tool for suppressing the workers. The trouble with this collection of hypotheses is that we are not interested in assembling it *for its own sake*: normally at least, we are interested in generating a set of possible explanations for a phenomenon only to the extent that this helps us to *actually* explain this phenomenon. What this means in the present context is that the interest of the evolutionary perspective cannot merely be seen in its presenting a *possible* explanation of the Wason Selection Task data – it must be seen in its presenting an *actual* (though possibly false) one. In turn, this truth-focus immediately marks this use of evolutionary theory as explanatory in the sense of (X) above, and not as heuristic in the sense of (H) above. Hence, this objection does not interfere with my argument either.[9]

For all of these reasons, it becomes clear that the best interpretation of Cosmides & Tooby's work remains an explanatory one. Moreover, it is easy to see that this conclusion generalises to many other evolutionary psychological research projects.

For example, most of David Buss's work on 'Sexual Strategies Theory' must also be seen as trying to *explain* the differences and similarities in the way in which human females and males choose mates (see e.g. Buss & Schmitt, 1993). This comes out clearly from the fact that Buss *begins* his research by empirically substantiating the widespread supposition that males tend to want different things from the things that females want (at least in some cases), and then uses Trivers's theory of minimal parental investment to *account* for these differences (see e.g. Buss, 2003; Buss & Schmitt, 1993; for some critical remarks concerning this theory, see Schulz, 2010). Much the same holds for Gigerenzer et al.'s work on simple heuristics (see e.g. Gigerenzer & Selten, 2001): Gigerenzer et al. use evolutionary theory only to explain various *known* social psychological findings about how we make decisions (see e.g. Simon, 1957) – they do not use evolutionary theory to contribute to these findings *being made*. Similar remarks can be made about much of Pinker's, Daly & Wilson's, and Symons's work, and that of many other researchers in this area (for more on this work, see e.g. Barkow et al., 1992).

Overall, therefore, it becomes clear that the case for the heuristic interpretation of evolutionary psychology has not yet been made: most of the classic examples

[8] I thank an anonymous referee for suggesting this objection to me.

[9] Note also that the existence of a cheating detection module cannot be taken for the 'phenomenon' suggested by the evolutionary perspective, as this would beg the question (it would build the theory into the observations). See also Sober, 2008, chap. 2.

of the research program – i.e. those associated with the Santa Barbara School (Buller's 'EP') – do not support this interpretation particularly well. However, as the next section aims to make clear, it *is* possible to find an instance of evolutionary psychological research that does so – it is just that it takes some work to do so.

## 10.4 Natural Pedagogy and Heuristic Evolutionary Psychology

Gergely and Csibra's work on 'natural pedagogy' stands in many ways in direct contrast to the typical research that goes on under the heading of 'evolutionary psychology'. For example, instead of embracing the nativism that frequently characterises the latter (see e.g. Sterelny, 2003; Carruthers, 2006), Gergely & Csibra emphasise the importance of *learning* and *development* for the way humans think and act. However, apart from this, their research remains very clearly within the confines of evolutionary psychology – in particular, they still use evolutionary theory as a key tool with which to study the features of our minds.[10] This last point is especially important here, for it is primarily through considering Gergely & Csibra's research that a limited defence of heuristic evolutionary psychology becomes possible after all.[11] To make this clearer, I again proceed in two steps: firstly, I present Gergely & Csibra's work as carefully as possible, and secondly, I assess it in light of the distinctions made in section 10.2.

### *10.4.1 Gergely and Csibra on Natural Pedagogy*

Gergely & Csibra begin their research by noting that various kinds of imitation studies have thrown up three remarkable facts.[12] Firstly, it has turned out that, while all infants will tend to imitate adults *sometimes*, they will not do so with equal frequency in all circumstances. In particular, infants are much more likely to imitate an adult's action after the adult has made eye contact with the child, has raised her eyebrows when facing it, or has clearly and directly addressed it verbally (see e.g. Gergely & Csibra, 2009; Csibra & Gergely, 2006). Gergely & Csibra

[10] As made clearer in section 10.1 above, this is all it takes for research to be 'evolutionary psychological' in the sense relevant here.

[11] Andrews et al. (2002, p. 538) and Buss et al. (1998, p. 545) claim that Thornhill & Gangstead's work on female preferences for symmetric men (see e.g. Gangstead & Thornhill, 1997) provides another example of a heuristic form of evolutionary psychology. Whether they are right in this is not something I shall discuss here (for some critical remarks concerning this, see e.g. Fuentes, 2002); what matters for present purposes is just that *most* instances of evolutionary psychological research are *not* heuristic in structure, and that finding exceptions to this requires hard work. See also below in section 10.5.

[12] For more on these studies, see e.g. Meltzoff (1988), Tomasello (1999), Csibra & Gergely (2006), and Gergely & Csibra (2009).

interpret this finding as showing that infants need to be informed that an important teaching episode is about to begin: the infant needs to be told that the present is an instance where imitation is called for (see e.g. Csibra & Gergely, 2006).

Secondly, Gergely & Csibra also note that when infants are imitating actions that an adult has previously performed, they tend to ignore elements of the actions that do not seem necessary to achieving the *goal* of the action. For example, when shown an adult that presses a button with her head *when her hands are occupied* (e.g. due to her holding a blanket), infants are much more likely to press the button with their hands than with their heads – thus ignoring the manner in which the model outcome was achieved (see e.g. Csibra & Gergely, 2006; Gergely & Csibra, 2009). Gergely & Csibra interpret this finding as showing that human infants have a natural proclivity towards choosing the most 'rational' means towards some particular end (see e.g. Csibra & Gergely, 2006).

Thirdly, Gergely & Csibra note that infants seem to operate with a 'best explanation' heuristic when determining what the content of a learning episode is. That is, infants *will* imitate the manner with which the action was performed if there is no good reason for why the adult would teach the infant the *goal* of the action.[13] For example, in the above study, infants will imitate pressing the button with their head when there is no apparent reason for the manner in which the adult acted – e.g. when the adult does *not* hold a blanket that occupies their hands (see e.g. Csibra & Gergely, 2006). Equally, infants will imitate the manner in which a character (e.g. a mouse) arrives at its proper location (its house) if the fact that this is its proper location had already been made salient (see e.g. Gergely & Csibra, 2009). Gergely & Csibra interpret this finding as showing that infants presume that the adult teacher is rational, and that she would not engage in unnecessary behaviour – hence, the infants infer that there must be a reason for why the button ought to be pressed with one's head, or for why the mouse ought to arrive at its house in a particular way (see e.g. Gergely & Csibra, 2009).

Given these three findings, Gergely & Csibra draw the following two conclusions. Firstly, they claim that humans are born with an innate capacity for natural pedagogy: as infants they are attuned to changing their behaviour in the light of the lessons conveyed to them in designated teaching episodes; as adults, they are innately aware of how to signal when they are about to initiate a teaching episode. For what follows below, it is important to note that this conclusion, on its own, is perfectly in line with the results of many other researchers (see e.g. Tomasello, 1999; Premack & Premack, 2003). Where Gergely & Csibra differ from the latter is in the *details* of the capacity for natural pedagogy that they posit.

Specifically, in their second conclusion, Gergely & Csibra argue that this capacity for natural pedagogy is a psychological *adaptation* that allows humans to acquire generalisable local knowledge which it would be difficult to code for genetically

[13] Alternatively, it might be said that infants determine whether the goal of a model action includes the manner in which it was performed by considering whether there is an obvious reason for how the teacher has performed it. For present purposes, either of these interpretations is acceptable.

(see e.g. Csibra & Gergely, 2006). In particular, they claim that since environmental conditions vary across different locales, it was more efficient for humans to be equipped with mechanisms for the rapid acquisition of the appropriate knowledge than to be born with a large store of knowledge for all eventualities. This made it possible for humans to avoid having to be burdened with a vast set of facts, most of which will be irrelevant to any situation they will ever find themselves in.

In more detail, Gergely & Csibra claim that we have evolved the capacity for natural pedagogy when we reached a point where complex tool use became crucially important to deal successfully with our environment, and when the workings of particular tools were very difficult to learn just by trial and error (see e.g. Csibra & Gergely, 2006). When these tools furthermore turned out to be useful only in specific local environments – so that it was not practical to code for the understanding of the tools genetically – natural pedagogy evolved. In this way, they come to argue that, given the conditions in which we evolved (and some general facts concerning the relative benefits of genetically coded versus culturally coded knowledge in different circumstances), the capacity for natural pedagogy is an adaptation for acquiring *a specific kind of knowledge*: namely, knowledge that is *generalisable* (i.e. that is important to more situations than the learning episode) and *local* to the particular environments we develop in (Csibra & Gergely, 2006, pp. 252-254; Gergely & Csibra, 2009).

This evolutionarily derived idea led Gergely & Csibra to perform several novel experiments (in what follows, I shall call these 'taste / teaching experiments'). The main idea behind these experiments is that, if the function of the adaptation for natural pedagogy truly is the acquisition of generalisable local knowledge, then infants should distinguish *teaching episodes* – which concern the features of various *objects* – from the *personal tastes* of the teachers (see e.g. Csibra & Gergely, 2006, p. 256). That is, if the function of natural pedagogy is the acquisition of *objective* information, infants should not be expected to learn anything about the *subjective* features of the teacher during a teaching episode – and that is so even if these subjective features are an integral part of the teaching episode (see also Gergely et al., 2007, p. 144).

This is exactly what we do find (see e.g. Gergely et al., 2007; Gergely & Csibra, 2009): if infants are taught that some object has 'positive valence' (i.e. is 'good' for human beings), then they expect this object to be chosen over other available objects – and this is independent of whether the adult doing the choosing has previously rejected this object during a teaching episode.[14] Note that this does not mean that infants cannot attribute subjective tastes to adults – in fact, this is quite within their

[14]The experimental design here is somewhat complex. The general gist behind it is the following: learning episodes are made to be incompletely uniform – some teachers are made to teach that some object A is 'better than' some other object B, and some the reverse. Given this, Gergely & Csibra hypothesise that if enough teachers teach that A is better than B, the infant will take A to have an 'objective' positive valence. Crucially, however, this positive valence will be kept separate from the 'tastes' exhibited during the teaching episodes by the individual teachers. For more on this, see Gergely et al. (2007).

powers (see e.g. Gergely & Csibra, 2009; Gergely et al., 2007). What this means is just that infants distinguish what adults are doing during teaching episodes – namely, expressing general facts about the local environment – from what they are doing otherwise – namely, acting based on their beliefs and desires.

### *10.4.2 The Place of Evolutionary Theory in Gergely and Csibra's Research*

Taking a step back, the above analysis thus makes clear that Gergely & Csibra use evolutionary theory in two ways in their research. On the one hand, they use it in an *explanatory* way: they put forward the hypothesis that our capacity for natural pedagogy is an adaptation in order to explain various findings concerning children's behaviour. For example, they use this hypothesis to account for the fact that the capacity for human pedagogy seems to be a human universal, that it is present from birth, and that it provides fitness benefits to an infant (see e.g. Csibra & Gergely, 2006; Gergely & Csibra, 2009). This is an explanatory use, as the relevant findings were *already known*, before Gergely & Csibra started appealing to evolutionary theory. Indeed, this use of evolutionary theory seems to be exactly parallel to Cosmides & Tooby's in the case of cheater detection: known phenomena are placed in a novel theoretical setting, which helps explain why they came about in the way that they did (or so it is claimed).

On the other hand, though, the above analysis also shows that Gergely & Csibra use evolutionary theory in a *heuristic* manner here. This use centres on the evolutionary hypotheses about the *particular nature* of our capacity for natural pedagogy that they put forward; it works in two steps. Firstly, Gergely & Csibra derive the specific nature of this learning mechanism – i.e. the fact that it concerns generalisable local knowledge – directly from the evolutionary considerations they put forward (see e.g. Csibra & Gergely, 2006; Gergely & Csibra, 2009). That is, they do not arrive at this hypothesis by considering vast amounts of empirical data (or the like), but by the careful consideration of their evolutionary arguments: they derive it only from what would be adaptive in a certain set of circumstances.

Secondly, it is then this specific nature of the capacity for natural pedagogy that must be seen to suggest to them the taste / teaching experiments described above. In particular, it is very plausible that it is only because of their consideration of what would have been adaptive in the EEA that they are led to inquire into whether infants can distinguish the tastes of the teacher from the content of a learning episode. Since the taste / teaching experiments confirm that infants in fact have this ability, evolutionary theory is thus shown to have been instrumental in our discovering features of our minds that we would otherwise have been ignorant about. In other words, it seems clear that it is only due to the consideration of the evolutionary perspective that we have become aware of the existence of a dedicated mental mechanism for teaching and learning (i.e. one that is separate from our mindreading skills in general). By (H), this therefore marks the use of evolutionary theory here as heuristic.

In this context, it is also worthwhile to note that, in so far as these evolutionary hypotheses are used in a heuristic manner, they themselves are not part of the tests that are being performed (see also Machery, forthcoming; Csibra & Gergely, 2006). In using evolutionary theory to *derive* the taste / teaching experiments, Gergely & Csibra are not seriously defending the above hypothesis about our cognitive evolution (in Csibra & Gergely, 2006, they call the derivation of this hypothesis a 'just-so' story). Of course, this hypothesis still *might* be true – however, establishing this is not the aim of this part of their inquiry. All that they seek to do there is find out more about how our minds work: evolutionary theory is relevant for this only to the extent that it helps us find out about phenomena that we would otherwise be ignorant about, and which are very revealing about the nature of our minds. To see this more clearly, it is useful to note two further aspects of the taste / teaching experiments.

Firstly, these experiments are not *obviously* interesting or suggestive about our minds. That is, comparing how infants react to teaching episodes with how they react to exhibitions of differing preferences among different people is not something that *straightforwardly* seems an interesting comparison to make. In fact, when first faced with the hypothesis of a capacity for teaching and learning, there seems to be little of interest in making such a comparison at all. For this reason, it seems clear that doing these experiments is not something that immediately suggests itself – their importance needs to be *discovered*. Hence, the value of the present heuristic use of evolutionary theory cannot be belittled by claiming that the phenomena it suggested were trivial or obvious to begin with.

Secondly, these experiments – or rather, their results – expand our understanding of our minds significantly. Finding out that, from an extremely young age onwards, we seem to be able to distinguish among differences in personal taste and the contents of learning episodes is a stunning result that greatly deepens our knowledge of human cognition. In particular, this result reveals a lot about the different psychological mechanisms that make up our minds – and thus, about the basic structure of our cognitive architecture. This matters, as it makes clear that, unlike in the case of Cosmides & Tooby's work, the findings suggested by the heuristic use of evolutionary theory in Gergely & Csibra's case are not subsidiary results, but the key elements of their account – it is primarily these experiments that suggest that humans have a capacity for natural pedagogy that is distinct from their abilities to imitate or mindread.[15] In this way, the phenomena revealed by Gergely & Csibra's evolutionarily-derived theory are shown to make for *new and deep* insights into human psychology, and thus to present issues whose further investigation is of great importance for a better understanding of our minds.

In short: since it is primarily due to the evolutionary perspective that the taste / teaching experiments have been performed in the first place, and since these

[15]For similar reasons, these experiments cannot be seen merely as *tests* of Gergely & Csibra's evolutionary hypothesis: the experiments have pointed to phenomena that are greatly interesting in and of themselves – whatever the best explanation for these phenomena will turn out to be.

experiments have pointed to phenomena whose investigation has greatly expanded our knowledge of our minds, this thus makes clear that Gergely & Csibra use their evolutionary hypotheses in a fruitful heuristic manner. In turn, this means that attacking these hypotheses for being evidentially ungrounded misses the point: they are not meant to explain why our mind has certain features – they are meant to *suggest* features that our minds *might* have, and which we should explore further in order to deepen our understanding of our psychological nature. For this reason, it becomes clear that Gergely & Csibra's work shows that a compelling heuristic form of evolutionary psychology really does exist.[16]

## 10.5 Conclusion

I have tried to argue that it *is* possible to defend the existence of a heuristic form of evolutionary psychology. More specifically, I have tried to show that the fact that the evolutionary hypotheses considered by evolutionary psychologists often lack evidential support *need not* mean that this makes the program scientifically dubious: in some cases, these hypotheses might merely be used as heuristic devices that point to issues that are usefully investigated further.

However, I have also tried to argue that this point must not be overemphasised – in fact, far from being a common occurrence, heuristic applications of evolutionary theory in psychology are actually quite a rarity. While such occurrences do exist, as yet, they are still in a minority: *most* cases of evolutionary psychological research – and, in fact, virtually all of the work of the Santa Barbara ('EP') School of evolutionary psychologists – employ evolutionary theory only to *explain* a known set of phenomena, not to lead us to *discover* these phenomena. Of course, this does not mean that these uses of evolutionary theory are necessarily unconvincing; however, it does mean that they cannot be defended by claiming that empirical support for them is not needed.

Looking forward, what this implies is that a compelling heuristic-based defence of any particular evolutionary psychological research project can only be done by carefully analysing the *details* of such a project. Only this can reveal whether a heuristic reading of this project is plausible or not: in particular, only this can show that, in the case in question, evolutionary theory was in fact instrumental in pointing to

[16]In this context, it is also worthwhile to note that Gergely & Csibra's work does not point to any specific features of evolutionary theory as being responsible for its heuristic usefulness. In particular, nothing in the above shows that it is specifically the fact that evolutionary theory is a backwards looking, population-level theory (or some such) that makes it a useful heuristic device. In fact, everything said here is perfectly consistent with the fact that theories from other sciences could play similar roles in psychology – as made clear in note 4 above, I here leave it open precisely *why* evolutionary theory can be used to suggest interesting phenomena to investigate further. Of course, as a matter of fact, no other theory has been given the prominence that evolutionary theory has when it comes to psychology. Why that is so, though, is an interesting question that has as yet not been convincingly answered.

novel and interesting phenomena about the way our minds work. Overall, therefore, it becomes clear that the heuristic defence of evolutionary psychology, while not fully implausible, must be treated with a lot of care.[17]

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[17] Interestingly, this rather restrictive conclusion also has some implications for the plausibility of defending heuristic applications of scientific theories more generally. Given the considerations presented in this paper, it becomes clear that it is far from obvious that scientific theories, in general, are *often* used in a heuristic way: this requires special conditions to be satisfied, and should not necessarily be assumed to be very widespread. However, defending this more general claim in detail calls for a paper of its own.

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