

## Knowledge *A Priori* – from Plato and Kant to Piaget

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I met Horst Pfeiffle a decade ago in a chance encounter with all the markings of necessity. Chairing a session »Piaget and Philosophy« at a JPS<sup>1</sup> conference, one paper (Pfeiffle 1999) attracted my attention with a doubly arresting title on the psychogenesis of the *a priori* in the hands of Kant and Piaget. I would have had to attend its presentation anyway. In academic disciplines, the *a priori* has led to a parting of the ways in being almost non-existent in psychology, and almost always central in philosophy. Since my interests are in both, I was intrigued to know how to square this circle. So let me explain why that 1999 paper, whose argument has been recently re-visited (Pfeiffle 2008), addressed a good problem with an answer that has turned out to be engaging in my work.

Here's the problem. You all know that the natural numbers 1, 2, 3 ... continue to infinity. Now think of any number, for example  $2^{43112609}-1$  which happens to be the largest known prime number. And as you also all know, Euclid proved there to be an infinity of primes. Is the next natural number – is the next prime number – already there awaiting discovery? Under realism, the answer is Yes: all numbers are already in existence (Frege 1979); under constructivism, the answer is No: none is in existence unless invented (Wittgenstein 1978). Since these answers are contraries, they cannot both be right. Well then, which is right, or are both wrong? Actually, this problem is a classic with a venerable history, well known to Plato, Kant, and so Piaget. Let's check this out.

### *Plato*

The Meno paradox is a denial of the common sense view that mathematical knowledge is acquired through learning. A boy with no training in geometry is led through a series of questions-and-answers about a truth implied by the Pythagorean theorem, i.e. the square  $S^2$  on the diagonal of a square  $S^1$  is double in area – call this P. The boy initially denied that he knew P, but eventually agreed to P and also accepted that he knew P. A central premise runs thus:

the knowledge which this boy has now – he either acquired it sometime or else always had it (Meno, 85d in Plato 1994).

The boy either has acquired P or already has P in his possession. Plato then argued for two things. One: the first alternative is false, and the second true. Two: these alternatives are exhaustive – there are no other alternatives – and exclusive – a knower who already possesses P cannot acquire it, and a knower who acquires P cannot already possess it. The conclusion follows on. The boy knows P; this knowledge was not acquired; therefore, the boy already had this knowledge. The conclusion is counter-intuitive since the boy had neither any prior training in geometry and at the outset of the Q&A had actually denied that he knew P, a denial that seemed eminently sensible. So how did the boy come to know the right answer?

Plato's answer was a version of realism. Under his metaphysics, mathematical truths are interpreted by analogy with the series of natural numbers that is already in existence: no number acquires a successor since any number already has a successor. Adapting Wittgenstein's (1978, 408) example, God knows whether 777 occurs in the decimal expansion of  $p$ , whether or not we do. Thus truths such as P are already available and merely await human discovery. Under Plato's epistemology, knowing is the discovery of pre-existing truths. The soul is the repository of human knowledge that persists through multiple lives, i.e. more lives than the actual life that the knower is currently experiencing (cf. Meno, 85e). And the human knower has a soul that secures self-identical ownership of truths in virtue of this previous access to them. For Plato, there is no such thing as learning P; instead, there is a cognitive search the success of which amounts to the recollection of P that is already in the knower's possession. Grasping a truth requires it to be »tied down ... by reasoning« since it will otherwise »run away« (Meno, 98a). But the right reasoning – reasoning that is normatively right – ensures the permanence of knowledge.

Plato's argument has been massively influential. Leibniz (1996, 85) contended that the argument is tenable provided its »mythical« elements are recast in terms of innateness that operates together with learning, the acquisition of all knowledge, and not to its complete exclusion, as Locke (1975) had suppose. Yet the disjunction »innate or acquired« proved to be misleading in view of Kant's distinction between the temporal antecedence and epistemic apriority.

### *Kant*

Kant's (1933) constructivism included two requirements about human knowledge under its »universal conditions of construction« (B742). One was a requirement for all knowledge to be acquired. For Kant, all knowledge has its debut in experience in virtue of conditions of acquisition that never have a derivation – i.e. deduc-

tion – from experience (B1). The other requirement concerned these conditions of acquisition. For Kant, these always included *a priori* knowledge, i.e. »knowledge absolutely independent of all experience« (B3) whose criteria were »necessity and strict universality« (B4). Paradigm examples of necessities fitting these criteria were the mathematical truth » $7 + 5 = 12$ « and the principle »everything that happens has its cause« (B13-15). But these two requirements were combined with a third which ensured that Kant's position becomes hoist by its own petard. The petard – the bomb – was primed in a famous distinction (B116):

jurists, when speaking of rights and claims, distinguish in a legal action the question of right (*quid iuris*) from the question of fact (*quid facti*); and they demand both be proved.

Kant's point was that an account of the [i] origin of knowledge is never sufficient since the many forms of pseudo-rationality have an origin in the human mind – his example was fate; another is primitive community in natural rights theory (see below). Yet such concepts are disreputable and illegitimate. What is also required is an account of the [ii] constitution of knowledge whose demonstration depends on normatively right reasons. Kant referred to this as a deduction in the sense that any knower whose knowledge is objective had a rational capability operative in its epistemic legitimation. Apriority is at the core of this legitimation, regarded by Kant as fit for purpose, not as a tower reaching to the heavens but rather as »a dwelling house, just sufficiently commodious for our business on the level of experience, and just sufficiently high to allow of our overlooking it« (B735).

And so the petard exploded. For Kant, all knowledge is acquired and so has an [i] origin in experience only through its [ii] constitution in virtue of the apriority in the knower's possession. Crucially, [i] is factual and [ii] normative, where »both be proved«. Most commentary has centred on the adequacy of Kant's proof of [ii]. Actually, its main weakness lies in his position on [i]. Kant evidently regarded the latter's proof to be based on evidence accessible to anyone at all in being derived »from the necessary use of the understanding, which, *without any psychology, a man finds in himself*« (1972, 173; my emphasis). This is a revealing admission: apriority is already there awaiting discovery. The »necessary use of the understanding« is a capability for judgment-making [*Vermögen zu urteilen* (B94)] whose use guarantees the constitution of all acquired knowledge. But no capability at all originates *ex nihilo*, at least not in human minds. Further, this admission is serious, amounting to a major limitation on the scope of Kantian constructivism that turns out to have affinities with realism. Crucially, if apriority is already there for anyone to find it,

then apriority is not an acquisition.

It will be objected: there are several ways in which apriority might be interpreted by Kant as an acquisition. Let's see, then.

[a] *Apriority as preformation*. Kant suggested that apriority may be »a kind of preformation-system of pure reason« (B167). The implied reference is to Leibniz (1996) for whom innate ideas were comparable to seeds to be nurtured in experience. Notice, firstly, that this interpretation requires preformation, and so fails to resolve the difficulty. Secondly, this type of preformation is impoverished in lacking the necessity required by apriority. Thirdly, in the same paragraph, Kant specifically rejected this as an interpretation of his own expressed commitment to epigenesis.

[b] *Apriority as innateness*. Lorenz referred to his biological version of Kantianism in which »functional structures anterior to all individual human experience [are] probably genetic [and deal with what] is *a priori* in animals and in man« (in Piaget 1971, 53). The reduction of apriority to innateness is common in psychology (Chapman 1988). Kant, however, explicitly separated apriority from innateness (Kitcher 1990). So this interpretation is a non-starter.

[c] *Apriority as »original ground«*. Kant claimed that he had identified the principal epistemic categories in his »list of all original pure concepts« (B106). The function of these categories was to secure »the original ground of [Nature's] necessary conformity to law« (B165) because they were »the original laws of reason« (B396). His rationale ran as follows. Knowledge with a historical origin – *cognitio ex datis* – is restricted unless combined with principled knowledge – *cognitio ex principiis* (B863). Essentially, anyone whose knowledge is historical in being »originally given« is typically restricted in this sense: »if we dispute a definition, he does not know whence to obtain another« (B864). This use of »original« has consistency in its favour. Yet it leaves unresolved the question at issue, namely how the formative aspects of knowledge can be combined with their preformative aspects, where the latter are neither theological [Plato], nor biological [Leibniz, Lorenz], nor psychological [Locke].

[d] *Apriority as »original acquisition«*. This interpretation has recently been recommended by Pfeiffle (2008). His argument seems attractive – but is it? Kant borrowed this notion »from the laws of natural right« with a view to establishing »a relation between genesis and structure« (ibid., 491). The last three words here are taken from Piaget – more on this later – in that genesis maps on to [i] and structure to [ii]. So the proposal is that »we originally acquire the principles *a priori*« (491) in that apriority has an origin and so is not an implanted disposition – neither biological nor theological – incompatible with their necessity. That is why Kant's po-

sition steers clear of both Locke's empiricism that does justice to [i] but not to [ii], and the nativist rationalism of Leibniz that does justice to [ii] but not [i]. Yes, indeed. But everything now hinges on the interpretation of [ii] whose explication runs thus. »The principles *a priori* do not reside in the subject, only the reason that allows them to be acquired is, in fact, innate [and] becomes real through an original activity« (492). But this explication is ambiguous. It could refer to a singularity, namely reason as an innate disposition. This is wisely rejected – »Kant is not endorsing some hypostasized claim to power over knowledge on the part of the faculty of original acquisition« – since that would be a relapse to the already rejected position of Leibniz. Alternatively, this explication could refer to a plurality, namely reasons in particular contexts *hic et nunc*, such as »Everything that happens has its cause. This log is floating down-stream on this river in England at noon today. Therefore, the river is its cause« (cf. Kant 1933, B13, B237). This particular reason is not innate; rather it is a spontaneous act of human knowing here and now, i.e. originality is a manifestation of epistemic spontaneity. That would fit Kant's own remark that as a knower I can »represent to myself the spontaneity of my thought [and] it is owing to this spontaneity that I entitle myself an intelligence« (B158). An intelligence – yes; but not thereby an intelligence with apriority. Leibniz (1996) had already remarked that a truth innately present in the mind still had to be learned, where the learning could be either demonstration of its necessity, or by example and so non-necessary. Something more is required for the conversion of truth into the necessity intrinsic to apriority, otherwise learning by example collapses into principled demonstration.

[e] *Apriority as »natural right«*. In jurisprudence, principles are required for demarcating valid possession of property, e.g. the land on which your home is built, from invalid occupancy, e.g. my squatting on your land. For Kant (2004, sect. 6; cf. 1933, B313), these principles deal with natural rights as practical reason directed on objects *qua noumena* in contrast to their counterparts of pure reason bearing on objects of principled representation, phenomena. Notice, firstly, that this admission means the apriority of pure and practical reason can never be identical – it can, at best, be only analogical. Secondly, the analogy is weakened by Kant's (2004, sect. 6) explicit denial that there ever was an original – historically original – state of common ownership: that is a »fiction«. Thirdly, even if an individual is entitled – has a right – to acquire any object not already belonging to anyone else, e.g. a plot on common land can become mine if it is not already owned by you and if you recognise my right in practice (sect. 10), my acquisition is not preemptory acquisition, not mine absolutely. For that, a civil constitution is required: »the ra-

tional title of acquisition can therefore only lie originally in the idea of the will of all united implicitly, or necessarily to be united, which is here tacitly assumed as an indispensable condition (*conditio sine qua non*) (sect. 15-17). This ingenious argument depends on the key notion of originality without resolving the earlier problem. United consent was never historically given – temporal originality is a fiction. Yet united consent is required by Kant’s argument as a logical priority – and that is a question-begging requirement whose factual origin remains indeterminate in Kant’s account. Actually, his account faces a fundamental challenge in that »we have a situation, then, where the whole body of citizens is seen as safeguarding an institution which it has in the first place to be coerced into accepting« (Williams 1977). For Kant, a civil constitution could legitimate peremptory acquisition in terms of synthetic *a priori* principles, but only through the wrong type of aetiology for its own rationality

Kant’s constructivism is one step forward from Plato’s realism. But the other step remains entrenched in a residual realism. This is the petard at the core of Kant’s epistemology. Apriority requires two steps in the same direction. These steps are taken in Piaget’s epistemology in which the petard is defused.

### *Piaget*

In his inaugural lecture, Piaget (1925) expressed a strong commitment to Kant’s epistemology whose central principles he then changed. His Kantian commitment was evident in his own model whose two main principles were that all knowledge has a factual origin [*genèse*] and a normative constitution [*structure*] (Piaget 2006; Smith 2009a). These match Kant’s key distinctions [i] and [ii] above. But the change proved to be major, turning on the Kantian schematism of the understanding, and is reviewed in four steps: necessity, epistemic instrument, normative facts, construction of necessities.

*Necessity:* For Piaget, Kant’s epistemology demonstrated that the human mind has a structure in that »we know things only through forms and schemata [*schémas*] that our mind imposes on them. ... in human intelligence, we find a certain number of principles, notions or schemes [*schèmes*] that it is impossible not to use« (Piaget 1925, 194-95). The distinction between *schémas/schèmes* was apparently unremarked by Piaget in this paper; it was explicitly drawn later in his first infancy book in 1936. It is one thing to claim that all knowledge has a structure; it is something else to claim that the structure is always the same. For Piaget, there are many types of schemes, including action-schemes in prelinguistic infants and operational schemes in adult thought. All schemes are structures with an organisation charac-

terised through a normative framework [*cadre*] – a network of norms – conferring meaning on the agent's actions and acts. A framework is »the sum-total of rules of control which intelligence makes use of for its own direction« (Piaget 1932, 405). Each new action amounts to a regulatory change in the norms and so the framework, either as reinforcement or as correction. So the crucial issue is not whether all knowledge has a structure, but which structure it is. And this applies to the distinction between necessary and non-necessary knowledge.

The distinction between the necessary and the simply given, or even the necessary and the conventional was infinitely more difficult to establish than Kant supposed. The most famous example in this regard is that of non-Euclidean geometries. For Kant space – and in fact Euclidean space, the only one known at the time – was the *a priori* form of sensibility. [Yet in the 19th century it was shown that] Euclidean space was simply one possible form of space among many others ... [And] the same can be said about all the Kantian apriorities ... What appears necessary at one moment in history no longer always appears so in the sequel. (Piaget 1925, 195-96)

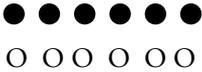
This last sentence has devastating implications. Piaget's point is that necessary knowledge is a variable throughout the whole of human development, i.e. throughout both sociogenesis and the history of science, and psychogenesis or children's development. It is devastating because it implies that necessity is never invariant in human development. Consequently, Kant's epistemology is undermined by its requirement for necessity to be invariant, when there could be no such thing. But since necessity is a criterion of apriority in Kant's epistemology, it follows that apriority is also suspect under its Kantian interpretation. The open question is whether there is an alternative interpretation, notably through one of its defining criteria, necessity. It is no doubt for this reason that, for more than 50 years, Piaget stated his principal problem to be how to explain the formation of necessary knowledge (Smith 2009a).

*Epistemic instrument.* Piaget did not regard this conclusion as a refutation of Kant's epistemology, but rather as a reminder that an alternative interpretation was required as to the nature of the *ipse intellectus* (Piaget 2006, note 30), the epistemic instrument by whose use objective knowledge is acquired. And that is why the distinction *schémas/schèmes* is significant. For Piaget, a Kantian schema linking an *a priori* intuition and empirical representation never could emerge fully formed at any developmental point. Rather, any scheme has a temporal formation in an agent's actions and acts (Piaget 2006, notes 4-5). In particular, an empirical check

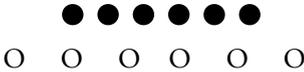
is required to ascertain whether any epistemic instrument – such as Platonic form or Kantian apriority – »was actually at the subject’s disposal. Here, whether we like it or not, is a question of fact« (Piaget 1977, 5\*)<sup>2</sup>. Notice two things. Firstly, Piaget (1986, 313) accepted that a knowing subject is always norm-laden. Further, this is so from the cradle to the grave: »from the beginning and even among our youngest subjects, a physical fact is recorded only within a logical-mathematical framework, however elementary it may be« (Piaget 2001, 320). The implication is that the constitution of objective knowledge is not preformed. Instead, epistemic formation is a step-wise progression over time. For example, a necessitating relation is intrinsic to the transitivity of *smaller than* – if  $A < B$  and  $B < C$ , then  $A < C$ . That is, necessitation is intrinsic to a norm that, according to Piaget’s evidence, is mastered in mid-childhood. And so the question arises »how does the [knowing] subject manage to become committed to such norms?« (1977, 17\*). Piaget’s argument was that even though there is no evidence to show that a fully-formed Kantian schema is used during the child’s first years of life, there is evidence to show that a more primitive structure is used from mid-childhood onwards. A scheme is such a structure.

It will be objected: which structure is this – there are infinitely many? Yes, of course, and that is Piaget’s point since »a ›structure‹ is therefore nothing but a short-lived crystallisation, always transcended in fact by the mind in its functioning« (1931, 160). The identification of which structure is in use is an empirical matter for the science of psychology. But since psychology is blind to the difference between facts and norms (1925, 197), psychology alone is incapable of settling the question as to whether it is the right structure, i.e. a legitimate structure to use. That is why a normative discipline is required as well. For Piaget, Kant’s distinction between the [i] origins and [ii] constitution of knowledge maps on to the distinction between normative facts for interpretation in empirical psychology and norms in epistemological theories. Piaget’s developmental epistemology is directed on the relations between normative facts and norms (Smith 2009a).

*Normative facts:* Piaget’s psychology is a psychology of normative facts. The use of a norm is a normative fact. For example, a mathematical rule such as »add 2« is a norm, and rule-following, such as judging that  $6 + 2 = 8$ , is a normative fact. The central concern in this psychology is with which norms are used, how they are used, and why they are used (for a research review, see Müller/Carpendale/Smith 2009). Here’s an example of children’s use of norms in number conservation (Smith 2002). The children, aged 5-7 years, were presented with a line of six blue and six white buttons in one-one spatial correspondence



and almost all agreed that there was the same in each. The line of white buttons was then extended with one button protruding by a couple of centimetres at each end



For some children [10%], there were now *»more blues because these two aren't there«*. In their view, there were now six blues in one line and four whites in the other. As such, this was not miscounting; rather, it was normative misconception – these children had used their norms to determine which buttons were or were not still *»in«* each line. Different norms in modal reasoning about necessity were displayed by other children [15%]. In their view, there was *»the same in each because it's always got to be the same, because it's just stretched out so it's a longer length«*. This evidence shows that the norms used by the two groups of children were not the same; that the former norms did not match those required by Kantian apriority; but that the latter norms were analogous, and even comparable, to the norms of apriority required by Kant's epistemology.

It will be objected: this evidence is about incorrect reasoning, whereas Kant's epistemology deals with true knowledge to which it is irrelevant. Not so. Even though most [75%] of the children in this study answered the question *»is there still the same in each?«* correctly, their answers were correct, but typically not based on a necessary rationale. The standard position in developmental psychology generally is that reasoning about necessity is an accomplishment of adolescence with a gradual formation over childhood (Moshman 2009). Actually, the norms behind *»more blues«* are pseudo-norms, and Piaget's (2006, 8) argument is that pseudo-norms make a contribution to the formation of valid norms.

*Construction of necessities:* Piaget's (1925, 209) early claim about *»the deep relationships that unite action and reason«* was recast in his final paper where the role of reasons is *»to introduce new necessities into systems where they were merely implicit or remained unacknowledged«* (2006, 8). An agent's inferential reasons are norms-in-use [*pratique*] reflecting the norms in an operative framework. These reasons are gradually accessible both to thought [*conscience*]. A science of the mind that ignores inferential reasons has no doubt given priority to measurement without due regard for meanings, notably the norm-laden meanings in the

actions and acts of agents during their human development. Notice three things here. Firstly, reasons may be learned from someone else or be one's own reason, i.e. original in being trivially or profoundly novel. Secondly, reasons are never singletons since the question »why?« is indefinitely iterative. This is because norms are never singletons, but always co-occur with other norms in networks, i.e. frameworks. Thirdly, reasons can embody inferences in being necessitating reasons, whether implicitly or explicitly. These inferential reasons are based on norms amenable to systematization in alternative logical models. The plurality of norms and of reasons results in their complexity, and that is why the formation of knowledge takes time through serial levels of comprehension. This series includes necessity-denial, pseudo-necessities, limited necessities, and unlimited necessities (for examples, see Smith 2009a). And it is always open to novelty and revision in that intellectual formation stretches indefinitely backwards and forward [*régression sans fin, construction sans fin*] (quoted in Smith 2009a). That is why all knowledge has a history, and a future too. Quite simply, »there is, therefore, an internal dynamism for necessity« (Piaget 1986, 314), and this includes »incomprehensible, insane, bizarre, deviant, partial, normal, and creative uses« (Smith 2009b).

## Conclusion

Piaget's constructivism, then, looks like this. Human knowledge has its origin in action and its legitimation in action-frameworks whose organization changes in their use through the lifespan. Progress in the natural and human sciences does in fact take place. For Piaget, these are veritable human constructions. That is why in Piaget's (1972) epistemology, apriority is not a »*terminus a quo*«, but rather a »*terminus ad quem*« – apriority has no temporal antecedence in human development, even if its emergence is a limit on its later phases.

Questions in normative epistemology, such as »What is *a priori* knowledge«, remain unresolved. Their counterparts in Piaget's developmental epistemology, such as »How does *a priori* knowledge develop?«, require scientific evidence without sacrificing their normative analysis. My contention is not that Piaget's epistemology has provided a complete answer to his question, but rather that his question is answerable in work with a jointly empirical and normative focus. This is a welcome and productive problem-shift.

Four challenges are now reviewed due to Hume, Frege, Wittgenstein, Bickhard.

*Hume (1965)*: facts never entail norms. This non-entailment is respected in Piaget's (1966, 135; Smith 2006a) psychology of normative facts. Normative facts are facts that never entail norms, even though as facts they are amenable to empirical investigation. But normative facts are not causal facts since norms are not causes. So there are two reasons why causal psychology is inherently incapable of explaining by itself the formation of knowledge. Firstly, its causality is blind to normative distinctions. Secondly, its factuality reinforces its blindness.

*Frege (1964)*: psychologism is the fallacy of explaining norms away in their psychological explanation. Piaget (1966, 132; Smith 2006b) accepted that psychologism is a fallacy. There are two ways to respect this fallacy. One is through anti-psychologism whose »division of labour« is such that norms are for explanation in normative disciplines, and facts in empirical disciplines. Causal psychology and logical empiricism are committed to this stance. The other is through non-psychologism with an integrative focus on the relations between norms and normative facts. This is the stance invoked in Piaget's epistemology directed on the relations between normative facts in psychology and norms in normative theories.

*Wittgenstein (1978)*: rule-use is the sole criterion of any rule, i.e. there is no such thing as a rule all of whose uses are preformed. For Frege (1964), this amounts to »a hitherto unknown type of madness« (14). For Wittgenstein, it is the rule-following paradox, whereby any use is not inherently incompatible with any rule. Piaget's position is the latter: a rule is an ideal object devoid of ontological meaning in his constructivism. A good thing too: the construction of novelties includes the formation of »new relationships and new instruments of thought« (Smith 2009b).

*Bickhard (2009)*: substance metaphysics is incompatible with process metaphysics required by modern science. Plato made twin commitments to a substance metaphysics and a realist epistemology under which the human soul is the immortal repository of true knowledge. Kant's constructivism contains residual manifestations of the same pair under which apriority secures true knowledge for human knowers at the outset of experience. Piaget's constructivism is compatible with a process metaphysics that was manifest in his first book through to his final paper.

In short, a classic problem in the history of education continues to be the relative contributions of the duality »innate/acquired«. Yet this is a mischievous way to formulate the problem. One reason is because Plato's eternal knowledge present in individuals at birth and Kant's a priori categories of objective knowledge are thereby merged under the innateness category along with genetic mechanisms based on DNA and neuro-cognitive functioning. Another reason is because there is currently an almost irresistible temptation to interpret »innate/acquired« in terms of

causality, either by denying normativity altogether, or by reducing normativity to causality. A better way forward is to start from normativity as a distinct category operating inter-dependently with the duality. Individuals are born with normative capabilities whose use is required for their individuation, characterization and improvement. The identification of »good specimens« of the many forms of normativity, notably norm-laden meanings, norms-in-use, pseudo-norms, and novel norms is a principal task in education. Piaget's work has set a lead with its focus on the normativity of inferential reasons as a central aspect of human development. In education, and elsewhere too, there is much still to be done.

## Notes

- 1 Jean Piaget Society: society for the study of knowledge and development; <http://www.piaaget.org/>.
- 2 A page number with an asterick denotes my emendation of a published translation.

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