HISTORICAL ROOTS OF THE NATURALISTIC APPROACHES TO CULTURE: FROM BALDWIN THROUGH CAMPBELL TO DENNETT

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The advances of present day naturalism

The naturalistic approach has a long tradition in psychology, even in its modern forms: it has been with us since the mid-19th century. Advances in our knowledge of the nervous system and in understanding "the transmutation of species" have been the eternal moving forces. During the last generation, many of the traditional vicissitudes and traps of these approaches have seemed to be resolved or at least softened. There are several basic reasons for this change, which all have to do with a more complex image replacing traditional dualities with at least triangles and models of multiple causation (Pléh 2008):

- Psychologists as well as naturalistically minded social scientists entertain a double faced biology in parallel, treating proximal and distal factors as proposed by Mayr (1982) together. They tend to forget the traditional division of labor, where either neuroscience or evolution is used as a frame of naturalistic reference for psychology.
- Genes and plasticity are treated together in evo–devo programs, not as exclusive factors, both in biology (Müller 2007) and in developmental studies in psychology (Lickliter 2008; Ellis and Bjorklund 2005).
- Elementary sociality is treated as a basic starting point rather than as a result of external constraints (Tomasello 1999, 2009; Gergely and Csibra 2005; Csibra and Gergely 2009). We do not have to believe in 'supraindividual minds' or the like to deal with the social aspects. Even the social aspects of the human mind should be found in the mind itself. This is of course a simplification. As Peter Richerson (2013) pointed out to me[1], "in the case of cultural evolution, population level processes do real work. The mind is important but it is the population that is the reservoir of the cultural information that (human) minds acquire."
- Naive hermeneutics is postulated, with the idea that the social search for meaning is treated as part of our human nature (Dennett 1990).

This change of outlook has multiple consequences for the study of cultural phenomena as a crucial type of social phenomena. In the present paper, I shall try to show that during its 150 years, the Darwinian approach to psychology has attempted an evolutionary interpretation of cultural phenomena several times, and these traditions may give interesting inspirations for recent research.

[1] Peter Richerson has helped me with careful reading and several useful comments that are occasionally included in text itself.

A list of ancestors

It would be futile to overview the entire Darwinian enterprise in its impacts on psychology. I would rather concentrate on historical traditions that specifically relate to the issue of *naturalization of culture.* Still, in Table 1, some hints are given concerning what I consider to be substantial achievements of psychological evolutionism over its 150 years of history.

Table 1. Some substantial successes of evolutionary psychology over 150 years

Success	Name	Challenging aspect
Instrumental learning	Thorndike Skinner	Selection tower??: Thinking
Critical periods	Lorenz	Closing?? factors in humans
Hierarchy of behavioral organization	Jackson-Freud	Alternative roots of development
Attachment and its styles	Hermann, Harlow, Bowlby	Lifelong effects?
Species specific behaviors	Lorenz	Are there human ones?
Social learning	Baldwin	Causes of culture?
Empathy and altruism	Baron-Cohen	How human specific?
Bell curve of abilities	Galton	Ethnic and gender factors
Personality types	Pavlov	How far inherited?
Extreme variations	Simonton	Talent and evolutionary pathology

There were three ways in which Darwinism and the evolutionary ideas of the late 19th century at large have played a crucial role in the formation of a (then) alternative, more dynamic and functional psychological thinking that can be contrasted to classical unanchored experimental psychology of the Wundtian kind. They currently contribute to the opposition to a disembodied representational cognitive psychology (Pléh and Gurova 2013). The notion of adaptation applied to the mind, the very idea of development, both of the ‘race and the child,’ as well as the emphasis on individual differences are the cornerstones of early psychological evolutionism that persists to this day. The combination of these inspirations is far from being trivial. Yet some recent applications of evolution in psychology openly deny, for example, the relevance of individual differences (Cosmides and Tooby 1992).

For much of the 20th-century social science, Darwinian proposals carried the unfortunate social overtone that there are primitive cultures and languages, contrasted with developed modern ones (Haeckel 1904). Many social scientists have critiqued this attitude. From Franz Boas on, the emphasis on the equality of cultures and languages has been overextended towards questioning any use of evolutionary theory applied to human society (see Lewis 2001). This has resulted in three features of standard social science summarized by Pinker (1997):

– The human mind became interpreted as an unbound general purpose learning machine with no (biological) constraints. This is of course an oversimplification on the part of Pinker. As Peter Richerson (2013) reminded me, most of the time behaviorists supposed such constraints, as presented by Baum (1994).
– Cultures were supposed to differ radically from each other.

– These cultural differences and varieties were assumed to shape the formation of individual mental architecture.

This traditional Standard Social Science Model (SSSM) view treats humans as entirely flexible beings, with a relativistic praise of the power of cultures. There were several slightly different approaches navigating between naturalism and SSSM emphasizing the role of interactions in implementing this cultural determination, or even, cultural unfolding, from James Mark Baldwin through Georg Herbert Mead, Henri Wallon, Lev Semjonovich Vygotskij up to Michael Tomasello and Richerson and Boyd, as of today. In this version, knowledge would be interpreted as inherently social, but it would become an integral part of the individual mind, not through some unidentified process of social instruction, but rather through interactions with others.

In what follows, I shall try to show that three major ideas of the Darwinian era still have relevance for our understanding of the natural foundations of culture:

– The issue of social learning in Baldwin's work.
– Pools of selection according to Karl Bühler.
– The vicarious selection cycles of Donald Campbell and Daniel Dennett.

Baldwin and his effect

James Baldwin was one of the crucial American figures who applied evolutionary ideas to development (Baldwin 1894a), to society (Baldwin 1909, 1911), and who interpreted development as a non-trivial evolutionary tuned process of social learning (Baldwin 1894b, 1896). Baldwin was very productive (see Cairns 1992 about his life). Near the end of his life, he himself summarized in a statement what was important in his achievements (Baldwin 1930: 29):

> The things I value …: first, the genetic *Method* pursued and, secondly, the *Results* acquired in genetic and social Psychology and Philosophy. These results may be briefly summarized as follows:
>
> 1) *General and Experimental:* Child Study results; Imitation and Circular Reaction; Motor Interpretations generally.
> 2) *Evolution:* The theory of Organic Selection; the theory of Genetic Modes, serving as the basis of Genetic Science and of General Evolution.
> 3) *Social Psychology:* The social origin of the Self; the Correlation between personal and social growth through the processes of Imitative Assimilation and social "give-and-take."
> 4) *Genetic Logic:* ... 'Instrumentalism' of knowledge and thought; development of Affective Logic and the theory of Value…
> 5) *Aesthetic Psychology:* Nature of Art Appreciation; the place in philosophy of Aesthetic Intuition (Pancalism).

Baldwin was a very ambitious theoretician. He was not much worried about the detailed description of given phenomena, but concentrated on the big picture of both individual minds and the evolving human mind as such. As his present-day interpreters summarize his message, "[i]n sum, Baldwin epitomized the modernist quest to understand the basic processes and the structure of those processes within a grand developmental theory. Against the spirit of today's piece-meal research, Baldwin strove for a philosophically coherent system that could account for mental development not only of the child, but of the species. Through such aims, Baldwin went on to sketch the course of development, outlining the relationship of ego, alter, and socius (Ferrari, Runions and Fueser 2003: 7).

Baldwin (1894a, 1894b, 1897) as a psychologist dreamed of accounting for development and change by developmental social psychology rooted in evolutionary ideas. While his idiom was definitely progressivist when talking about society, he tried to avoid the organicist analogies of Spencer: "The progress of society in its method, direction, and demanding motives is similar rather to the development of consciousness than to that of biological organisms" (Baldwin 1897: 521).

Baldwin in his *Mental Development in the Child and the Race,* published in 1894, summarizes the importance of evolutionary ideas for the study of children, and also outlines a specific theory about the origin of mind. The essence of the methodological principle is that child development *provides explanatory principles* for "adult psychology." The analysis given by traditional laboratory psychology can only be proved through data on the formation of mental processes. Translated into modern terms, cognitive psychology has to have a developmental and an evolutionary embedding. Developmental psychology for Baldwin is a theoretical discipline: it helps to answer the problems of traditional psychology: "The genetic theory[2] reverses all of this (structural questions of adult consciousness). Instead of a fixed substance it assumes a developing, growing activity" (Baldwin 1894a: 14).

Baldwin's (1894a, 1897) ambitious projects first tried to give an analysis of development and a change in the terms of social psychology rooted in evolutionary ideas.

The theoretical developmental psychology elaborated by Baldwin has two key elements that are with us today as well. The first is his conception about *the genesis of self.* According to him, self and self-consciousness are developmental products. The separation into Ego and Non-Ego comes around in the process of interaction with other peers, and being social has a constructive role in the genesis of the internal world that was taken to be self-sufficient and self-enclosed by classical psychology. In his book on ethical principles and social life, he outlines his ideas that imitation is crucial for social integration – an idea taken up from Tarde (1890). Imitation and circular reaction (i.e., the repetition of an action which tends to keep up its own stimulating process, like when mother and child smile at each other) are interpreted by Baldwin (1894a, 1894b) as internal processes as well, as a sort of internal boosting, that obtains meaning in a social setting (Baldwin 1897: 15):

> The 'ego' and 'alter' are thus born together. … And the two get purified and clarified together by this twofold reaction between project and subject, and between subject and eject. My sense of myself grows by imitations of you, and my sense of yourself grows in terms of my sense of myself. Both ego and alter are thus essentially social; each is a socius, and each is an imitative creation. … This give-and-take, essentially imitative,

[2] We have to remember that in Baldwin's usage *genetic* meant developmental and did not have the meaning which we assume today.

constitutes a 'dialectic of personal growth,' which is at the same time that of social organization. Society, genetically[3] considered, is not a composition of separate individuals; on the contrary, the individuals are differentiations of a common social protoplasm.

The conclusion is that the individual is a "social outcome, not a social unit" (Baldwin 1897: 15). We are members of another. The oppositions, conflicts, antinomies of personal and social life are late developments, which are sharpened by the rise of reflective and ethical thinking.

This social conception of the genesis of mind, ego, and consciousness was taken up by George Herbert Mead (1934), combining inspirations from Baldwin and William James. Baldwin has had a continuous and successful influence in American psychology, as well as in French psychology, and his ideas show up in the work of Piaget (1962) and especially Wallon (1941), as analyzed in detail by Vyt, Bloch and Bornstein (1994).

The Baldwin effect

Baldwin's work has recently become much quoted and analyzed due to the importance of the "new factor in evolution" which he introduced (Baldwin 1896), which was much later called the Baldwin effect (Simpson 1953)[4]. The effect has become famous since it entails the idea that behavioral, ontogenetic adaptive changes may have a later influence on the organic development of the species, without being Lamarckian. It is very important to emphasize the anti-Lamarckian element here. Baldwin goes back 11 times(!) to strongly indicate that his approach provides an alternative to neo-Lamarckism. It is ironical that today, with the advent of clear models of epigenetic transgenerational inheritance, this issue is again seen in a new light (see Charney 2012).

We can summarize the "new factor" as a twofold claim:

– The abundance and selection process that characterizes Darwinian evolution is true for the individual life as well, that is, the extension of selection to individual development as proposed later by Karl Bühler, Karl Popper, Donald Campbell, and Daniel Dennett.
– These steps of individual selection may later have an influence on the life and therefore the habits of subsequent generations, creating a social inheritance effect, with the use of imitation.

In order to understand the intricacies of the proposal of Baldwin let us try to reconstruct the logic of his argument:

– Standard organic evolution is too slow as a process to account for the dynamic changes in behavior.
– The traditional view of inherited behavior is too passive.

In order the preserve the dynamism of the evolutionary approach to the mind, mechanisms are needed that *speed up behavioral change* and involve variation and activity on the

[3] I.e., developmentally. (Author's note.)

[4] For a good book about the recent rising interest, see Weber and Depew (2003).

part of the organism, without challenging the separation of the generation and the selection steps in the cycle. Baldwin goes on to list several factors that, from a behavioral perspective, allow for changes over the individual lifetime. He starts off from a table characterizing the factors of ontogeny.

Table 2. The factors of ontogeny

Ontogenetic Modifications	Ontogenic Agencies
1. Physico-genetic.	1. Mechanical.
2. Neuro-genetic.	2. Nervous.
3. Psycho-genetic.	3. Intelligent. – Imitation. – Pleasure and pain. – Reasoning.

Baldwin clarifies that the first issue is how these modifications can be adaptive, and the second is how they become stable psychological traits. Interestingly enough, for the psychologists, the first issue is very crucial since it entails Baldwin's theory of social learning. The second issue has become the core and crucial one for philosophers of biology and for theoreticians of evolution since it involves gene-environment interactions (Baldwin 1896: 441–442):

> Now it is evident that there are two very distinct questions which come up as soon as we admit modifications of function and of structure in ontogenetic development: first, there is the question as to how these modifications can come to be adaptive in the life of the individual creature. … The organism manages somehow to accommodate itself to conditions which are favorable, to repeat movements which are adaptive, and so to grow by the principle of use. This involves some sort of selection, from the actual ontogenetic variations, of certain ones – certain functions, etc. We … apply the phrase *Organic Selection* to the organism's behavior in acquiring new modes or modifications of adaptive function with its influence of structure. The progress of the child in all the learning processes which lead him on to be a man, just illustrates this higher form of ontogenetic adaptation. We then reach another question, second; what place these adaptations have in the general theory of development.

1) *Organic selection* is the basic principle of selection over the individual organisms lifetime (as contrasted to genetic selection) (Baldwin 1896: 552–553):

> *Organic Selection.* The process of ontogenetic adaptation considered as keeping single organisms alive and so securing determinate lines of variation in subsequent generations. Organic Selection is, therefore, a general principle of development which is a direct substitute for the Lamarckian factor. … *Organic* in the phrase was suggested from the fact that the organism itself cooperates in the formation of the adaptations which are effected, and also from the fact that, in the results, the organism is itself selected; since those or-

> ganisms which do not secure the adaptations fall by the principle of natural selection. And the word *Selection* used in the phrase is appropriate for just the same two reasons.

As Jolivet (2007: 317) summarizes the biological view:

– Environmental changes make a phenotype P adaptive.
– Some organisms acquire P and flourish in the new environment.
– There is selection on genes to make P innate.

The Baldwin effect, while creating an evo–devo issue about the determinants of development, also raises interesting possibilities of diminishing selection pressures due to behavioral and niche changes through the Baldwin effect. If we use clothing, heating, and air conditioning, due to these cultural changes, there is less need for morphological adaptation to heat and cold. In this regard, the present-day biological interpretation of the Baldwin effect also relates to the issue of niche construction and its role in shaping evolution (Laland, Odling-Smee and Feldman 2000).

What is very crucial for psychologists is that Baldwin maintains that there is a continuity here with behavioral variation and change during the individual's lifetime. He characterizes this continuity between physical and mental change at the end of his life in the following way (Baldwin 1930: 1):

> … since it is the one principle of Organic Selection working by the same functions to set the direction of both phylogenesis, the physical and the mental, the two developments are not two, but one. Evolution is, therefore, not more biological than psychological, … the individual organisms' accommodations … while not physically inherited, still act to supplement or screen the congenital endowment during its incomplete stages.

This is similar to what Richerson and Boyd (2005) and Boyd and Richerson (2009) call gene-culture coevolution today.

The use of tools that change the environment and in this way modify behavior is in a sense an important realization of the "new factor." Young (2012) gives a similar characterization of these functions and a clear historical reason why the new factor was so important for Baldwin's developmental, behavioral aspects. While Baldwin did not want to become a Lamarckian, he still was struggling against total preformism. He wanted to preserve the dynamicity of Darwin in his theory of individual development, to preserve plasticity in development.

2) *Learning based on reinforcement.* Baldwin, like Thorndike with his cats, also recognizes the importance of the child's ability to learn on the basis of the consequences of acts. The pleasure–pain principles and the so-called law of effect are as valid for habit formation as for genetically transmitted behaviors: "habit is the tendency of an organism to continue more and more readily processes which are vitally beneficial" (Baldwin 1894a: 476). The essential thing about habits is "the maintenance of advantageous stimulations by the organisms' own movements" (Baldwin 1894a: 477).

3) *Imitation* is a strong and efficient human tool to shortcut the search for behavioral variations. While reinforcement based learning speeds up adaptation, imitation is a further process to shorten the routes.

4) *Social heritage.* In humans, these processes add up to learning from the social environment that constitutes the social heritage. Social learning is beneficiary for the species (Baldwin 1896: 553):

> *Social Heredity.* The acquisition of functions from the social environment, also considered as a method of determining philogenetic variations. It is a form of Organic Selection but it deserves a special name because of its special way of operation. It is really heredity, since it influences the direction of philogenetic variation by keeping socially adaptive creatures alive while others which do not adapt themselves in this way are cut off. It is also heredity since it is a continuous influence from generation to generation. … [S]ocial adaptation sets the direction of physical phylogeny and physical heredity is determined in part by this factor.

Baldwin clearly sees this as a function of cultural inheritance (Baldwin 1896: 553):

> It keeps alive a series of functions which either is not yet, or never do become congenital at all. It is a means of extra-organic transmission from generation to generation … it keeps alive variations, thus sets the direction of ontogenetic adaptation, thereby influences the direction of the available choices.

On a descriptive non-committal level, there are three ways in which Baldwin's "new factor" can be implemented:

1) Epigenetic modulatory effects. Since the genetic makeup presupposes environmental effects and organistic "trials," certain solutions here will have more survival value. In this regard, Baldwin deals with the hot issue in evolutionary theory about the precise role of epigenetics, as Waddington (1942, 1957) does, and as we have already seen it.
2) The habit system itself also shows a selection cycle. This is the reinforcement based learning.
3) Habits develop cranes. For Daniel Dennett (1996: 164), the Baldwin effect is basically learning under the impact of consequences:

> the essence of the Baldwin effect is that creatures capable of reinforcement learning not only do better individually than creatures that are entirely hard-wired; their species will evolve faster because of its greater capacity to discover design improvements in the neighborhood. According to this point of view, natural selection operating on 'spontaneous variations' is sufficient alone to produce determinate evolution (without the inheritance of acquired adaptations or modifications), since – and this is the new point – in each generation variations in the direction of, or 'coincident' with, the function to be developed will favor the organisms possessing them, and their descendants will profit by the accumulation of such variations. … [T]he individual organism's accommodations,

made through learning, effort, adaptation, etc., while not physically inherited, still act to supplement or screen the congenital endowment during its incomplete stages, and so give the species time to build up its variations in determinate lines.

The fate of selectionism within psychology: The role of Karl Bühler

In the 1920s and 1930s, before the extended Darwinian theory took shape, there was a non-trivial downfall of evolutionary thinking in biology and social sciences as well, related to the birth of SSSM, as well as to post-war pessimism (Harrington 1996). There was a group of psychologists, biologists, and philosophers in Vienna, however, who maintained some radical aspects of the Darwinian theory, extending it not only towards psychology, but towards epistemology as well. They entertained two crucial ideas, which were relevant for the possible naturalization of culture:

– A multilevel theory of selection.
– A continuity claim between elementary and symbolic, cultural forms of behavior.

Karl Bühler, the leader of the Vienna Institute of Psychology, and a central figure in this extension, postulated three 'concentric' levels of selection: "For me, in Darwinism the concept of play field seems to be productive. Darwin has basically known only one such play field, while I point to three of them […] These three play fields are: instinct, habit and intellect" (Bühler 1922: VIII).

It is a basic idea in evolutionary biology, cognitive sciences, and even in contemporary cultural studies that mechanisms of change are characterized by a two-step Darwinian cycle. This extended cycle was first proposed by Bühler (1922, 1936). The three basic cycles of this model are distinguished as shown in Table 3.

Table 3. Bühler's reconstructed theory concerning the three cycles of selection (after Pléh 2008)

Features	Instinct	Habit	Intellect
Pool of selection	Individuals	Behaviors	Thoughts
Roads to selection	Darwinian selection	Reinforcement	Insight
Proofs	Species specific behavior	Associations New combinations	Detour
Originator	Volkelt, Driesch	Thorndike	Köhler
Organization	"Naturplan"	Associative net	Mental order

The essence of these models is the proposal for optimized mechanisms of change, where novelty generating and selectional phases are separated. The first phase is responsible for creating new reactions to environmental challenges, while the second phase is responsible for adequacy, for the accommodation to the environment.

1) *The Darwinian selection cycle.* Changes here are comparatively slow since the generators of change are random mutations, and changes involve high risks. As Richerson

(2013) reminded me, this was a classical vision. Recently, many comparisons show that genetic artificial selection can be very fast in some cases, and that the relative speed of cultural and evolutionary change depends on the life cycles as pointed out by Perreault (2012). In Darwinian selection, as Bühler first expressed it, our fate is at stake.

2) *Learning mechanisms.* On the basis of environmental feedback, from the many solution attempts produced by the reaction repertory of the organism, the ones leading to success (obtaining food, obtaining the praise of the teacher) lead to the stabilization of adaptive, fitting habits, as the trial-and-error conceptions of Thorndike and Baldwin showed it. The goal is the survival of the individual. Since these processes are based on neural mechanisms rather than on changes in the genome, changes in this cycle are much faster. Whereas the Darwinian mechanism requires at least a few generations to see a large change in a behavioral trait, changes in learning may occur in the magnitudes of hours, or, in higher mammals, in the magnitude of a few minutes.
3) *Thinking.* Humans, and to a certain extent non-human primates as well, form particular representations of the world. Mental representations due to their structural features lead to newer and newer representations. Thoughts in a way tend to have their own life. (This was the vision of the time and of Bühler. Of course, all that we know of some bird cognition today was not available back then.)

Several non-solipsistic social systems provide for their relation to the world. Many of these are individual, such as insight, but some of them arise from a fourth cycle, from the world of culture. The idea-based selection system is able to move in the fastest way, even in a predictive manner. While learning requires hours or minutes, for insightful understanding – once we have the representation systems – sometimes seconds are sufficient. As Richerson (2013) mentioned, this is true "under ideal conditions perhaps. It turns out that people are rather limited in their ability to make predictable large scale innovations. The evolution of simple artifacts like dinner forks and paper clips took an appreciable time to evolve."

4) *Culture.* It might seem strange to interpret culture as a selection system. Still, several broad theories try and do this strange move. Culture might be taken as a system where different varieties are produced, and then, in the world of integrative mechanisms of culture, in the context of social communication, some of them are taken as valid, some as invalid. For example, a new procedure emerges somehow to cut sheets of paper. This procedure becomes accepted in cultural selection when others are able to imitate it with ease and in an unequivocal and reliable manner.

   Culture, on the one hand, can be interpreted as a subsystem that combines blind habits based on cycle 2 with rational insight and representation based on insights of cycle 3. This combination is either based on imitation or on rational argument and on specific mechanisms like constrained imitation emphasized by Richerson and Boyd (2005) and Boyd and Richerson (2009).

The unity of biological and meaningful elements in human life is the second lasting impact, the continuation of Bühler's speculations on pools of selection. For Bühler, intention based, teleological and holistic organization is true of all behaviors, and it creates unity between the work of biology and that of the mind: "The distance between the integrated behavior of the amoeba and human scientific thought is certainly impossible to grasp. Still, on the basis of the most modern observations both can come under two common concepts: they are holistically organized and are characterized by meaningful events" (Bühler 1927: 127).

In his book on the crisis of psychology and then in his theory of language (Bühler 1934), this continuity between elementary and symbolic forms of behavior is presented as a detailed theory of three maps of human behavior as well as three functions of language. The internal, the behavioral, and the cultural–social have to be treated in a common model. On the one hand, Bühler was in the uneasy position of defending the reality of abstractions in directing human life, and, on the other hand, he was at the same time defending naturalism with a strong Darwinian flavor.

The continuation of selection theory into evolutionary epistemology

In the 1930s–1970s, the majority of psychologists with a remaining evolutionary interest, worked with children, animals, and individual differences, with transparent consequences of evolutionism, but with a much reduced theoretical interest compared to Baldwin's or Bühler's. The theoretical work was continued, however, in the frame of naturalized (and therefore psychologized) epistemology (Quine 1969) to use evolutionary theory to resolve issues of epistemology. Psychology in this way became an interpretation of Kantian epistemology as in the *épistémologie génétique* proposed by Piaget (1972), or of mental architecture as proposed by Popper (1972) and Campbell (1974) in their evolutionary epistemology of knowledge systems.

In two respects, Popper followed the path set for him by the *Denkpsychologie* tradition and Bühler. He rejected the traditional sensualist reductionism of psychology. This showed up as a triumphant overcoming of the problem of induction in his theory of knowledge (Popper 1976). Popper attempted to give a biological interpretation of the mental domain, and for this resolution of the puzzle of induction, he used a problem-solving model of change illustrated in Figure 1.

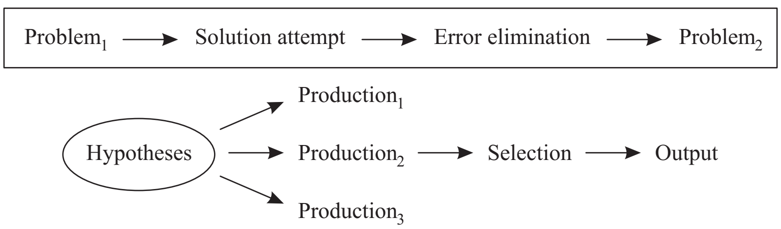

Figure 1. The solution–production–selection cycle according to Popper (1972)

The essential moment for Popper is the separation of production generation and selection, and the organizational similarity of all these cycles, from genes to social selection generation. Mid-20th-century evolutionary epistemologists, most notably Donald Campbell (1974), worked out these ideas in more detail into a general theory of trial-and-selection based systems. These principles can be seen as the most abstract generalizations of the Darwinian ideas, as summarized in Table 4.

Table 4. The multiple systems of selections according to Campbell (1974)

Domain	Example
Science.	Hypothesis–Solution–Choice.
Cultural accumulation.	Selection in technology.
Language.	Language variation.
Observation and imitation.	Social insects.
Thought supported by memory.	Imagery based solutions.
Visually supported thought.	Köhler: insights in apes.
Habit.	Rearranging control systems.
Instinct.	Organismic perceptual systems.
Vicariating locomotion.	Echolocation.
Problem-solving not relying on memory.	Tropisms.
Genetic adaptation.	Genetic variation and change.

All the selections proposed by Campbell have an underlying general structure:

1) All inductive growth of knowledge involves *a blind variation–selective retention cycle.*
2) This entails *variations, consequential selections, and a retention and transmission of selected elements.*
3) Short-cutting mechanisms have *an element of trial and error in their functioning as well, replacing locomotion by mental search, for example, and risking your ideas rather than risking your life.*

Number (3) in this list implies that 'intelligent' and mindful solutions also come around as consequences of selections. Later models, such as Hull et al. (2001), identified universal Darwinism with universal selections showing selections in species in neural networks and in immunology. Dennett (1996) with his Selection Tower metaphor would include individual behavioral and mental thought selection in this system.

What happens with the advent of evolutionary psychology?

The main proponents of the challenging neo-Darwinian program of evolutionary psychology (Cosmides and Tooby 1992; Pinker 1997) try to reduce culture as well to basic adaptive mechanisms. Bolhuis et al. (2011) summarized their provocative ideas as follows:

- The human mind is adapted to an ancestral environment.
- Gradualism: our mind does not adapt fast enough to new environments. There is a Stone Age man living behind modern facades.
- Massive modularity.
- Universal human nature.

Bolhuis et al. (2011) pointed out that today one would need a more flexible vision. First, one should consider the unfolding of niches, and in this way gene-environment coevolution. One should also look for broader adaptation than merely single behavioral traits, and in this process the understanding of development and a consideration of proximal mechanisms, i.e., the underlying neural structures and functions, should be used. Thus, evolutionary psychology should not be dropped but should include a broader set of problems and methods.

The difference between the present situation and the situation many decades ago is not to be found in our questions (our curiosity about whether animals can think or whether society was a natural system have already existed in the past 150 years), but in the larger data sets and the more sophisticated methods available today. For a redefinition of psychological issues in an evolutionary framework, the research of experimental cognitive psychology leads to a better understanding of the inner world of the human mind. We know better today what it is exactly that we have to explain.

Another factor was the development of human ethology into an experimental science along with discussions concerning sociobiology. The differences and continuities between sociobiology and evolutionary psychology (EP) are not at all as trivial as one sometimes feels. EP is a new vision, compared to sociobiology, since it deals with the inner world (it treats the psychological side as belonging to the proximal stage of explanation in the sense of Mayr [1982]), and it takes into serious consideration the results and methods of experimental psychology. There is, of course, considerable variation here. Some EP advocates easily deduce proximal mechanisms just from the foundational commitments of evolutionary theory lines, while others, as also represented in the present volume, try to find out how mental machinery and mental development really work. This is a big change compared to the attitude of sociobiology, which sometimes tended to treat the mental realm as an epiphenomenon. The change does not only flatter the permissible vanity of psychologists but broadens the levels to be dealt with in interpreting behavior.

Within that trend, the new approaches that assign sociality to the individual mind try to elaborate a theory of primary sociality which, at the same time, would not be instructionist in the sense of Cziko (1995, 2000). These attempts usually rely on the analysis of cooperation and empathy, primary attachment processes, the formation of a Theory of Mind, and the unfolding of intentional attribution both in children and across species, as Baldwin wanted a century ago. This is in line with Humphrey's 1976 proposal that social pressures were the basic factors in developing the human mental architecture. They all entertain a set of commitments towards the following:

– Humans are necessarily social beings; society itself is merely a modulation or a derived feature of this primary sociality.
– The roots of this sociality have to be looked for in individuals.
– One can talk about emergent interactionism in this sense.

The idea that the study of culture might be combined with evolution in the sense of denying essences is taken in a more complicated manner than it was first thought of, not as a relationship between existing cultures of today. One could imagine culture building capacity as a central, innate biological feature of the human mind, as emphasized recently by Tomasello (1999), who postulates that cultural learning as an adaptation is the basis of culture, and not the other way round. This is again an oversimplification. Richerson (2013) reminded me that there is an assumed interaction between social learning abilities and culture here: "The capacity to learn socially will increase, permitting the protoculture to get a little more sophisticated. Repeated rounds of gene–culture coevolution will eventually favor a quite sophisticated capacity for learning socially and an accompanying sophisticated culture to learn."

Similarly, the natural pedagogy approach of Csibra and Gergely (2009) and Gergely and Csibra (2005) presupposes that using the evolutionarily given constraints of mutuality and learning from adult cues, cultures are built up and maintained by an evolutionary learning process.

Interpreted in this way, the issue of culture is the issue of how to build these variant cultures and what advantages are brought about by the mere existence of culture and of representations that are liberated from the constraints of the here and now. This has always been a sensitive issue for biologists. Tivadar Huzella, a Hungarian biologist, characterized it in the following way: "Man stores the experience of his ancestors in costumes, writings, science, and art. This ability for 'external memory' is what actually differentiates man from the animals" (Huzella 1936: 197).

It is interesting to see what the fate of the selection models is in this rebirth of naturalized sociality. The analogical nature of the selection models proposed by Campbell (1974) in their most extensive form has often been criticized. Many authors have discussed the speed of cultural change as opposed to the conservativism of biological evolution and the Lamarckian nature of cultural change. These interpretations are summarized in Table 5. They are presented together with a strong criticism given by Hull (1982), who questioned the simplified contrasts. We can add to this that, from Baldwin's time on, while the unity of the mechanisms was emphasized, it was clear for the Baldwin–Bühler–Popper–Campbell line that with the more symbolic and more cultural selections speed increases and risks are reduced. Their "teleological argument" for higher cycles is exactly an account for the speed of change.

Table 5. The emphasis on differences between biological and cultural evolution and their critique by Hull (1982)

Opposition	Biological evolution	Cultural evolution	Hull's criticism
Category boundaries	Biological: Sharp	Fuzzy, mushier categories	Species is a dynamic concept as well
The course of change	Darwinian: Selectionist	Lamarckian: Intructionist	Instructions in culture are not omnipotent
Teleology	No goals	Goal driven processes	Culture has accidental features as well

Hull (1982), reacting to these criticisms, pointed out that a naïve opposition that biology and culture are based on an oversimplified interpretation of biological processes. For example, it is not true that biological categories (species) are always sharply delineated. On the level of both biological and cultural concept formation, scientific categories, for instance, are dynamically changing, 'historical' categories. Human communities are not fixed, and neither are biological species: isolated cultures may become separated, fairly well-bounded ethnic groups when communication between them is sufficiently rare, in the same way as species bifurcate due to isolation. Concerning intentionality and goal directedness, both Hull and Dennett (1987, 1996) claim that humans freely apply the intentional stance, but this should not create the illusion that teleology would be valid in the outside world as well. As Dennett (1990), in a paper with the provocative title "The interpretation of texts, people and other artifacts," pointed out, there is no principled difference in the human treatment of evolution, the interpretation of each other as intentional agents, and the interpretation of cultural objects like literary works and other human artifacts. With regarding to all of these, one can take the intentional stance, but we should not take this too substantially, we should use it merely as an interpretive strategy. Thus, in this regard, there is no difference between biology and culture. According to arguments like that of Baldwin's, learning agents can influence the evolution of the genes or their culture.

Barrett, Dunbar and Lycett (2002) show in their textbook that even the nearly exact (genes) versus the much less exact (culture) reproduction is rather questionable. They mockingly compare the "heritabilities" in biological and cultural traits. Interestingly enough, some of the cultural traits show as much correlation within human populations as biological traits do. The heritability of height is 0.86, and that of religion is 0.71. "Cultural transmission, it seems, is both reliable and surprisingly robust by comparison with genetically transmitted traits," as Barrett, Dunbar and Lycett (2002: 356) claim. The same is true for the comparison of the speed of cultural and evolutionary change (Perreault 2012).

One can take a reversed vision of the cycles as well. Starting from the cycle of culture, some subsystems, such as science, create socialization patterns which direct the learning systems of cycle 2 from the world of thinking that corresponds to cycle 3. We teach the new generation to read, write and count, in order to provide them with representational systems that allow for faster mental selection and more efficient planning.

Since the time of the synthesis of Mendelian genetics with Darwinism, the relationship between levels of selection rests on the assumption that biology has no inheritance of acquired characteristics, not even in the domain of behavior. Results obtained in selection cycle 2, through individual learning and knowledge accumulation, can in no way have an influence on cycle 1. At the same time, characteristic interactions do take place between cycles 2 and 3, as well as 3 and 4. Several proposals today, the most notable among them being that of Tomasello (1999) and Gergely and Csibra (2003), point out that a striking feature of humans, even in contrast with other primates, is the teaching attitude. We are a teaching and learning species, prepared to learn from our seniors and to teach the juniors, and from early on we apply a pedagogical stance, as Gergely and Csibra (2003) phrase it. This means that in the selection system of cycle 2, we have peculiar expectations for inputs coming from cycle 4, from culture. We have expectations that "others (or teachers)" shall direct our learning systems according to comprehensive systems of expectation and the world of thinking, and cycle 3 shall come through this teaching–culture interaction. Starting from the theory of culture one could also raise several arguments to the effect that one of the advantages of modernization would be the move of culture towards creating more and more subsystems that allow for a wider control over cycles 2 and 3, i.e., over learning and thinking. This directing influence, as Donald (1991, 2001) outlined it, means that the representational systems arising from cycle 3 have an influence on individual learning and information processing mechanisms. According to Donald's conceptualization, these subsystems create cultures of different types, and this is the framework of having feedback from cycle 4 given to cycles 3 and 2.

There is one more interesting difference brought about by our modern age that still has to be elaborated. The original nature–society–culture continuity aims mostly fit into a selectionist metatheory. The recent interest in the social mind, on the other hand, combines the Machiavellian and the pro-social elements of human social relations. There are many details already in place, but it is still an interesting future task for the theoretical interpretation of the heritage of the naturalization of culture to clearly see the relationships between these two modes of sociality.

References

Baldwin, J.M. (1894a) *Mental Development in the Child and the Race: Methods and Processes*. New York: Macmillan.

Baldwin, J.M. (1894b) Imitation: A chapter in the natural history of consciousness. *Mind* 3, 26–55.

Baldwin, J.M. (1896) A new factor in evolution. *American Naturalist* 30, 441–451 & 536–553.

Baldwin, J.M. (1897) *Social and Ethical Interpretations of Mental Development: A Study in Social Psychology.* New York: Macmillan.

Baldwin, J.M. (1909) *Darwin and the Humanities.* Baltimore: Review Publications. Electronic version: http://archive.org/stream/darwinandthehuma00balduoft#page/n5/mode/2up.

Baldwin, J.M. (1911) *Individual and Society or Psychology and Sociology.* Boston: Badger.

Baldwin, J.M. (1930) Autobiography of James Mark Baldwin. In: C. Murchison (ed.) *History of Psychology in Autobiography.* Vol. 1, 1–30. Electronic version: http://psychclassics.yorku.ca/Baldwin/murchison.htm.

Barrett, L., Dunbar, R. and Lycett, J. (2002) *Human Evolutionary Psychology.* Houndmills: Palgrave.

Baum, W. (1994) *Understanding Behaviorism.* New York: HarperCollins.

Bolhuis, J.J., Brown, G.R., Richardson, R.C. and Laland, K. (2011) Darwin in mind: New opportunities for evolutionary psychology. *PLoS Biology* 9 (7), 1–8.

Boyd, R. and Richerson, P.J. (2009) Culture and the evolution of human cooperation. *Phil. Trans. R. Soc. B*. 364, 3281–3288.

Bühler, K. (1922) *Die geistige Entwicklung des Kindes.* 3rd edition. Jena: Fischer.

Bühler, K. (1927) *Die Krise der Psychologie.* Leipzig: Barth.

Bühler, K. (1934) *Spractheorie.* Jena: Fischer. New English translation: *Theory of Language: The Representational Function of Language.* Translated by D.F. Goodwin. Amsterdam: Benjamins.

Bühler, K. (1936) *Die Zukunft der Psychologie und die Schule.* Vienna and Leipzig: Fischer.

Cairns, R.B. (1992) The making of a developmental science: The contributions and intellectual heritage of James Mark Baldwin. *Developmental Psychology* 28, 17–24.

Campbell, D.T. (1974) Evolutionary epistemology. In: P.A. Schilpp (ed.) *The Philosophy of Karl Popper.* La Salle, ILL: Open Court, 413–463.

Charney, E. (2012) Behavior genetics and postgenomics. *Behavioral and Brain Sciences* 35, 331–410.

Cosmides, L. and Tooby, J. (1992) Psychological foundations of culture. In: J.H. Barkow, L. Cosmides and J. Tooby (eds.) (1992) *The Adapted Mind.* New York: Oxford University Press.

Csibra, G. and Gergely, G. (2009) Natural pedagogy. *Trends in Cognitive Sciences* 13, 148–153.

Cziko, G. (1995) *Without Miracles: Universal Selection Theory and the Second Darwinian Revolution.* Cambridge, MA: MIT Press.

Cziko, G. (2000) *The Things We Do: Using the Lessons of Bernard and Darwin to Understand the What, How, and Why of our Behavior.* Cambridge, MA: MIT Press.

Dennett, D. (1987) *The Intentional Stance.* Cambridge, MA: MIT Press.

Dennett, D. (1990) The interpretation of texts, people and other artifacts. *Philosophy and Phenomenological Research* 1 (Supplement), 177–194.

Dennett, D. (1996) *Kinds of Minds.* New York: Basic Books.

Donald, M. (1991) *Origins of the Modern Mind: Three Stages in the Evolution of Culture and Cognition.* Cambridge, MA: Harvard University Press.

Donald, M. (2001) *A Mind So Rare: The Evolution of Human Consciousness.* New York–London: W.W. Norton & Company.

Ellis, B.J. and Bjorklund, D.F. (2005) *Origins of the Social Mind: Evolutionary Psychology and Child Development.* New York: Guilford Press.

Ferrari, M., Runions, K. and Fueser, J. (2003) William Kessen and James Mark Baldwin: Lessons from the history of developmental psychology. *Developmental Review* 23, 1–8.

Gergely, G. and Csibra, G. (2005) The social construction of the cultural mind: Imitative learning as a mechanism of human pedagogy. *Interaction Studies* 6, 463–481.

Gergely, G. and G. Csibra. (2003) Teleological reasoning in infancy: The naive theory of rational action. *Trends in Cognitive Sciences* 7, 287–292.

Haeckel, E.H.P.A. (1904) *Wonders of Life.* New York: Harper.

Harrington, A. (1996) *Reenchanted Science: Holism in German Culture from Wilhelm II to Hitler.* Princeton: Princeton University Press.

Hull, D.L. (1982) The naked meme. In: H.C. Plotkin (ed.) *Learning, Development, and Culture.* Chichester: Wiley, 273–323.

Hull, D.L., Langman, R.E. and Glenn, S.S. (2001) A general account of selection: Biology, immunology and behavior. *Behavioral and Brain Sciences* 24, 511–573.

Humphrey, N.K. (1976) The social function of intellect. In: P.P.G. Bateson and R.A. Hinde (eds.) *Growing Points in Ethology.* Cambridge: Cambridge University Press, 303–317.

Huzella, T. (1936) *Az élet tudománya.* Budapest: Franklin Társulat.

Jolivet, P. (2007) Le principe de Baldwin ou l'effet Baldwin en biologie.Une bonne explication ou un échappatoire des darwinistes? *L'Entomologiste* 63, 315–324.

Laland, K.N., Odling-Smee, J. and Feldman, M.W. (2000) Niche construction, biological evolution, and cultural change. *Behavioral and Brain Sciences* 23, 131–146.

Lewis, H.S. (2001) Boas, Darwin, Science and anthropology. *Current Anthropology* 42, 381–406.

Lickliter, R. (2008) The growth of developmental thought: Implications for a new evolutionary psychology. *New Ideas in Psychology* 26, 353–369.

Mayr, E. (1982) *The Growth of Biological Thought.* Cambridge: Belknap Press.

Mead, G.H. (1934) *Mind, Self, and Society.* Edited by Charles W. Morris. Chicago: University of Chicago Press.

Müller, G.B. (2007) Evo–devo: Extending the evolutionary synthesis. *Nature Reviews Genetics,* 8, 943–949.

Perreault, C. (2012) The pace of cultural evolution. *PLoS ONE* 7 (9), e45150. doi:10.1371/journal.pone.0045150.

Piaget, J. (1962) *Play, Dreams and Imitation in Childhood.* New York: Norton.

Piaget, J. (1972) *The Principles of Genetic Epistemology.* New York: Basic Books.

Pinker, S. (1997) *How the Mind Works?* New York: Norton.

Pléh, Cs. (2008) *History and Theories of the Mind.* Budapest: Akadémiai Kiadó.
Pléh, Cs. and Gurova, L. (2013) Existing and would-be accounts of the history of cognitive science: An introduction. In: Cs. Pléh, L. Gurova and L. Ropolyi (eds.) *New Perspectives on the History of Cognitive Science.* Budapest: Akadémiai Kiadó, 1–34.
Popper, K.R. (1972) *Objective Knowledge: An Evolutionary Approach.* Oxford: Clarendon Press.
Popper, K.R. (1976) *Unended Quest: An Intellectual Autobiography.* London: Fontana.
Quine, W.V. (1969) *Ontological Relativity and Other Essays.* New York: Columbia University Press.
Richerson, P. (2013) Personal commentaries on this paper.
Richerson, P.J. and Boyd, R. (2005) *Not By Genes Alone: How Culture Transformed Human Evolution.* Chicago: University of Chicago Press.
Simpson, G.G. (1953) The Baldwin effect. *Evolution* 7, 110–117.
Tarde, G. (1890/2012) *Les lois de l'imitation.* Paris: Alcan. Electronic version http://classiques.uqac.ca/classiques/tarde_gabriel/lois_imitation/lois_imitation.html
Tomasello, M. (1999) *The Cultural Origins of Human Cognition.* Cambridge: Harvard University Press.
Tomasello, M. (2009) *Why We Cooperate.* Cambridge, MA: MIT Press.
Vyt, A., Bloch, H. and Bornstein, M.C. (1994) *Early Child Development in the French Tradition: Contributions from Current Research.* Mahlah, NJ: Erlbaum.
Waddington, C.H. (1942) The epigenotype. *Endeavour* 1, 18–20.
Waddington, C.H. (1957) *The Strategy of the Genes.* London: Allen and Unwin.
Wallon, H.L. (1941) *L'évolution psychologique de l'enfant.* Paris: Armand Colin.
Young, J.L. (2012) The Baldwin effect and the persistent problem of preformation versus epigenesis. *New Ideas in Psychology* 31 (3), 355–362.