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## Rediscovering James Mark Baldwin

Anna Rita Calandrini<sup>a</sup>, Giuseppina Marsico<sup>ab</sup>

<sup>a</sup>*Department of Human, Philosophic and Education Sciences, University of Salerno, Italy*

<sup>b</sup>*Federal University of Bahia, Brazil*

## Abstract

James Mark Baldwin played a significant role in the birth of the American experimental psychology at the end of the 19th century. Known for his evolutionary theory that takes his name (The “Baldwin effect”), as well as for the significant influence he exerted on the more famous Piaget in the epistemological field, Baldwin represents a controversial, long-forgotten and only recently rediscovered intellectual figure. After taking his first steps in the field of Scottish mental philosophy, the encounter with German experimentalism led him to apply the scientific method to the study of the development of the child’s mind. Baldwin is among the first scientists to identify the profound link between the evolution of mental faculties and phylogenesis. During the last season of his intellectual life, he devoted himself to the creation of evolutionary epistemology. The present article, after retracing the main stages of his theory illustrates organic selection as a mechanism underlying the ontogenetic and phylogenetic development of the human mind, the laws of habit and accommodation, the role of imitation and the social transmission of “intelligent” functions. This study ends with a reflection on Baldwin’s influence on evolutionary studies during the 20th century, and his oblivion and “rediscoveries”.

**Keywords:** Baldwin; Evolution; Imitation; Mental development; Piaget.

\*Corresponding author.  
Giuseppina Marsico  
Department of Human,  
Philosophic and Education Sciences,  
University of Salerno  
Via Giovanni Paolo II 134, 84084,  
Fisciano (SA), Italy.  
Phone: +39 089 962320  
E-mail: gmarsico@unisa.it  
(G. Marsico)

## Introduction

James Mark Baldwin (1861-1934) belongs to the first generation of American “experimenters” who contributed to the transformation of American psychology from intuitionism to “new scientific experimentalism”, which took place towards the end of the 19th century.

The rapidly changing American society of the 1880s and 1890s, which saw the presence, among others, of figures such as George Herbert Mead and John Dewey, inspired by the intellectual guide of Charles Sanders Peirce and William James, provided fertile ground for the development of Baldwin's innovative work. In those times, new ideas emerged that went beyond the classic patterns of thinking and believing. At the same time, people experienced new ways of living in urban environments and witnessed the increase in immigration and the consequent use in everyday life of a plurality of languages. America was turning into a melting pot of new ideas, and the younger generation of intellectuals played an active role in these change processes. (Valsiner & van der Veer, 2000). However, a distinctive feature that differentiated Baldwin from his colleagues was the profound link with traditional mental philosophy, inherited from his mentor James McCosh (1811-1894), which led him to the study of Darwinian natural selection and Wilhelm Wundt's (1832-1920) new experimental psychology. Taking a cue from the classification proposed by Robert Wozniak (Wozniak, 1982), it is possible to recognize in Baldwin's theory three distinct phases, which correspond to radically different works: (1) the first phase, clearly based on mental philosophy, which characterized him until 1889, (2) a second phase, in which he engaged in the studies of child and developmental psychology, corresponding to the years 1889-1903, and finally (3) a third phase mainly dedicated to the construction of evolutionary epistemology in the years 1903-1915. As Wozniak himself pointed out, an attentive analysis of Baldwin's scientific production shows a constant “synthetic” effort in the evolution of his thought as he ambitiously attempted to resolve the contradictions emerging from the clash between the old and the new psychology, philosophy and science, internal description and external experimentation, and reason and material reality (Wozniak, 1982).

Baldwin was the author of the first systematic and psychological studies on child behaviour that led him to overcome the pre-established coordination between mind and body inspired by the Scottish spiritualism. He described intellectual development in the individual as a process in continuous evolution, which is carried out through mechanisms of assimilation and cognitive accommodation. Baldwin was the first to introduce the “biosocial” theory of individual adaptation, to highlight the need for a joint study of the child's intellectual development and the evolution of the mind in the race, and one of the first scholars to correlate ontogenetic development with the phylogenetic one, with special focus on its socio-cultural implications, the imitative process and social heritage.

Baldwin's psycho-genetic approach to the problem of individual development was based on the systematic observation of the child during his early stages of development, the dialectic of assimilation and accommodation and the notion of

development. Such an approach allows us to consider Baldwin a precursor of the psychology of cognitive development of Jean Piaget (1896-1980) and an important source of inspiration for other great European psychologists including Pierre Janet (1859-1947), Lev Vygotsky (1896-1934) and Lawrence Kohlberg (1927-1987). Baldwin's name is often associated with studies on the evolution of the mind, particularly since 1953, when George Simpson used the expression “Baldwin effect” to indicate that evolutionary mechanism by which an adaptive ontogenetic change is subject to natural selection (Simpson, 1953). Recent progress in the field of evolutionary epistemology, as well as the latest studies on evolution in psychology and biology, have favoured a “rediscovery” of Baldwin's theories (Continenza, 1982; Morgan & Harris, 2015; Pertile, 2019). The interest in the so-called “Baldwin effect” reflects the increasing attention to the relationship between behaviour and evolution and the recognition by today's scientific community of the possibility that selection is the result not only of the action of the environment but rather of the dialectical-constructive interaction of the organism and the environment (Sánchez & Loredo, 2007).

However, despite his remarkable popularity with his contemporaries and his merits in having anticipated concepts and mechanisms that later became points of reference in developmental psychology and genetic epistemology, Baldwin and his theories have been “forgotten” for over half a century (Broughton, 1981; Loredo Narciandi, 1999; Obiols & Berrios, 2009), and only in recent decades, they have been gradually brought back from their temporary oblivion. As an example, in his *A history of experimental psychology*, Boring dismissed Baldwin's intellectual achievements, simply noting that “*Baldwin's felicitous literary style, surpassed only by James, gave a transient vitality to his ideas; but his effect was not permanent*” (“Boring, 1929, p. 518”). There have been numerous hypotheses on the causes that determined what could be called real ostracism against this American psychologist. According to Mueller (1976) and Russell (1978), one of the causes lies in his opposition to the positivist approach just at the moment when the latter was fully recognised in psychology. Another motivation was his attempt to consolidate the relationship between philosophy and psychology just when G. Stanley Hall (1895) and others successfully attempted to free psychology from the authority of metaphysics and epistemology (Broughton & Freeman-Moir, 1982). A third factor concerns the shifting of the attention of the intellectuals of the time from Baldwin's symbolic interactionism to the more pragmatic and less Hegelian one of George Mead (Mead, 1934). To these factors must be added his lack of followers as well as a style considered excessively speculative, which certainly did not contribute to the diffusion of his ideas (Cahan, 1984). In 1908, at the height of his academic career, when he had been recently elected to preside over the upcoming International Congress of Psychology, Baldwin was arrested in a brothel in Baltimore. Following this event, he was forced to resign from his chair of Philosophy and Psychology at Johns Hopkins University and since then has been generally “forgotten” by his American colleagues. In addition to the scientific-intellectual reasons, it is not possible to overlook the effects of the Baltimore scandal, which forced him to leave the United States and relegated him

first to Mexico and then to France, thus ending his academic and scientific career in advance. In support of this vision, Richards underlines the moral and scientific ostracism suffered by Baldwin by stating:

*“Baldwin’s colleagues implicitly judged him to have breached that admixture of professional and personal principles. And a scientist, perceived to have sinned against norms of professional honesty and integrity, must struggle against enormous odds to have his work henceforth taken seriously.”* (Richards, 1987, p.503).

The purpose of this article is to provide a general overview of J. M. Baldwin’s figure as an intellectual, psychologist and researcher, with particular attention to his main contributions in the field of developmental psychology. The article is structured as follows: a first section describes the essential stages of Baldwin’s *curriculum vitae* from his academic training to his teaching career, as the author of relevant scientific works and editor of important psychology journals, including the stages and fundamental works that characterized the development of his thought; a second section describes Baldwin’s evolutionary theory on the interaction between the ontogenesis and phylogeny processes, the imitative reaction and the social implications in mental development; the last section is finally dedicated to the influence that Baldwin had on developmental psychology, genetic epistemology and, above all, on studies about evolution during the twentieth century.

## 1. Biography and evolution of the thought of J. M. Baldwin

James Mark Baldwin was born in Columbia, South Carolina (USA) on January 12, 1861. He attended the faculty of theology at Princeton University where he graduated on June 18, 1884. In those years, thanks to a profound interaction with Presbyterian Minister James McCosh, president of Princeton University, Baldwin became greatly interested in philosophy. In McCosh’s (1872) vision, the human mind is the product of a creation of God, endowed with innate and universal tendencies: *intuitions*. Through them, the mind can perceive the world as it really is. For McCosh mind and reality exist in a pre-established harmony (or coordination), whereby scientific progress cannot contradict religious truth since both derive from God. By virtue of this principle, McCosh opens Princeton’s doors to Charles Darwin’s biological evolution and Wilhelm Wundt’s new experimental psychology.

### 1.1 - Integration between spiritualism and experimental psychology

Awarded with a scholarship, Baldwin had the opportunity to study for a year in Germany, where he got in touch with the new experimental psychology by following Wilhelm Wundt’s lessons for a semester; also in Germany, he followed a seminar held by Friedrich Paulsen (1846-1908) on Spinoza (1632-1677) that deeply impressed him. Spinoza’s pantheism provided him with a compelling justification for the pre-established coordination between the mind and the material reality derived from James McCosh’s intuitive realism.

In 1885, Baldwin returned to Princeton where he devoted himself to teaching French and German. Dissatisfied with his knowledge of the French language (Baldwin, 1926), Baldwin delved into the reading of French authors’s works, particularly passionate about a work by Ribot (1839-1916) entitled *German Psychology of Today* that opens the way for the “new” experimental psychology. The translation of Ribot’s work represents the starting point in the search for a form of integration between McCosh’s descriptive introspectionism and the new experimental psychology of the German tradition up to Wundt. It is from the same period, *Contemporary Philosophy in France*, in which Baldwin focuses on French spiritualism, claiming that *the time has come to combine science with spiritualism, through the use of its methods, its principles, and its indisputable conclusions. ... Philosophy must bend to experience. Spiritualism must bend to scientific methods.* (Baldwin, 1887a, pp. 138-139).

Also in 1887 Baldwin published *The Postulates of a Physiological Psychology* (Baldwin, 1887b), a work that summarizes all the influences Baldwin was subjected to during those years and whose relevance lies in its providing a general picture of his attempt to integrate Wundt’s experimental psychology with McCosh’s inductive mental science. Baldwin, in fact, defines experimental physiological psychology as the science of internal and external psychic phenomena, since there is an invariable relationship between mind and body, between consciousness and the unconscious.

In 1888 Baldwin obtained a PhD at Princeton by discussing a thesis against Spinoza’s materialism under McCosh’s guidance. The first volume of *Handbook of Psychology* with the subheading *Senses and Intellect* (Baldwin, 1889), is also from this period. It represents a complete form of integration between the Scottish mental philosophy and experimental psychology.

### 1.2 - Evolutionary psychology

The success of *Senses and intellect* allowed him to obtain the chair of Logic and Metaphysics at the University of Toronto. He remained in Toronto until 1893 and founded the first psychology laboratory in Canada. Meanwhile, in 1889 he married Helen Heyes Green, with whom he had two daughters: Helen and Elizabeth. His experience as a father was one of the reasons for his passage from mental philosophy to experimental evolutionary psychology. In fact, in his role as a father, Baldwin had the opportunity to conduct a systematic observation of the child during his early development stages, coming to grasp the initial immaturity and the progressive development of mental skills that are perfected day after day through continuous interaction with the surrounding reality. This new vision resulted in Baldwin’s distancing from Scottish mental philosophy as the coordination between reason and reality cannot be predetermined but is rather the result of an evolutionary process. In 1891 Baldwin published the second volume of the *Handbook of Psychology* subheaded *Feeling and Will* (Baldwin, 1891), in which the concepts of habit and accommodation appeared for the first time. During the same period, Baldwin elaborated a theory of mind development

in the child based on the regulation of habits and their arrangement in voluntary actions.

After the Canadian experience, in 1893 Baldwin returned to Princeton to fill the position of professor of Psychology. There he established a new psychology laboratory and worked on his most important contributions in the field of evolutionary psychology. Among his most relevant works of this period stand out *Mental Development in the Child and the Race* (Baldwin, 1895a) and *Social and Ethical Interpretations in Mental Development* (Baldwin, 1897). In 1896 in the article entitled *A new factor in evolution*, Baldwin describes a mechanism through which the acquired arrangements influence the evolution of a species (Baldwin, 1896a). This factor, at the time unnamed, will be renamed the “Baldwin effect” (Simpson, 1953).

In these works, Baldwin underlines the analogy between individual growth (ontogenesis) and the evolution of a species (phylogeny). This analogy consists in the fact that the adaptations acquired in the ontogenesis of an individual are transmitted to future generations, thus shortening the ontogenetic process (Baldwin, 1896a). Baldwin believed that the intellectual adaptation of an individual is based on the natural tendency of an organism to seek and preserve the situations that induce pleasure and to divert the experiences that cause pain. This mechanism, which Baldwin calls the law of *dynamogenesis*, is governed by the principles of habit and accommodation. The intellectual development of the individual takes the form of an imitative action in which the stimulus initiates a motor process that tends to reproduce this stimulus and, through it, the motor process itself, according to a circular reaction mechanism (Baldwin, 1895a). The imitative action, however, is not to be understood as the exact repetition of a previous action (because in this case there would be no progress).

On the contrary, it is only through a modified repetition, made possible by the active intervention of reason (conscious imitation), that the organism manages to protect and maintain its vital stimuli. If successful, the variations that cause pleasure or avoid pain are selected in order to allow a better adaptation of the organism. Through this process, which Baldwin calls *organic selection*, the individual develops a growing understanding of the world, or in other words, greater coordination between reason and reality. In the principle of organic selection, therefore, Baldwin once again finds the principle of Scottish intuitive philosophy of coordination between the human mind and material reality.

If in *Mental Development in the Child and the Race* and *A New Factor in Evolution* Baldwin had best expressed his evolutionary theory based on organic selection, in *Social and Ethical Interpretations in Mental Development* he provides an integrated view of his theory on human mind development and that on social adaptation. Based on this concept (Baldwin, 1897), Baldwin maintains that the thought of the individual self is the result of the social and cultural development of the individual, which is realized through the interaction with others. In essence, it no longer makes sense to talk about the Ego without taking into account the Alter, since they are inextricably linked by virtue of their joint growth process, made of conscious imitations, variations and oppositions,

which contribute to the construction of a common body of experiences leading to the formation of the so-called social partner (the *Socius*). In the last decade of the nineteenth century, Baldwin developed his concept on the psychology of development in the child and its connections with the evolution of the mind in the race, which was later collected in a single overall work entitled *Development and Evolution* in 1902 (Baldwin, 1902).

### 1.3 - Evolutionary epistemology

At the beginning of the new century, however, a fundamental turning point occurred in Baldwin's intellectual path: just as he was working at his most important contribution on evolutionary psychology, he left the field of psychology to devote himself to philosophy. The result of this change will be the construction of an evolutionary epistemology. Among the reasons for this change is Baldwin's observation of the impossibility of experimentally demonstrating his evolutionary theory (Baldwin, 1930). Another factor contributing to this philosophical turn is the re-emergence of epistemological questions in American philosophy in the early 1900s (Baldwin, 1930). The third and final factor that led Baldwin back to philosophy is his activity as editor of the *Dictionary of Philosophy and psychology* (Baldwin, 1905). The close collaboration that Baldwin established in this period with the greatest minds of the time had a decisive role in rekindling his interest in philosophy (Baldwin, 1930).

In 1903 Baldwin moved to Baltimore at Johns Hopkins University as a professor of Philosophy and Psychology. This position allowed him to devote himself entirely to epistemological studies without the worry of supervising the Princeton psychology laboratory:

*“The intellectual conditions of Baltimore were altogether favourable to work, and I began to put into shape the material which was to appear in the successive volumes of Genetic Logic.”* (Baldwin, 1926, pp. 122-123).

His epistemological studies on the nature and development of thought in relation to reality led to the publication of four volumes between 1906 and 1915: the first three are grouped under a single title *Thought and Things* (Baldwin, 1906; Baldwin, 1908; Baldwin, 1911); the fourth one is titled *Genetic Theory of Reality. They are the outcome of genetic logic as issuing in the aesthetic theory of reality called pancalism* (Baldwin, 1915). Baldwin describes the development of knowledge in the child through evolutionary phases that involve innate abilities and interaction with the environment. He outlines the development of intelligence starting from a *pre-logic* stage, passing through a *quasi-logic* one up to the *logic* one; at a higher level, there is the *hyper-logic* stage, which coincides with the aesthetic experience (Parsons, 1980). Baldwin defines this stage as a form of contemplation in which the immediacy of experience continuously tries to rebuild itself (Baldwin, 1915). This aesthetic experience consists in perceiving reality as an immediately knowable whole. At the height of the evolutionary process of the mind, Baldwin once again focuses on the integration between reason and material reality, a process that characterized his entire research activity.

In 1908 the scandal in which he was involved in Baltimore forced Baldwin to resign and leave the United States. From this moment, Baldwin dedicated himself to teaching in Mexico and especially in France, where he remained for several years. During this period, Baldwin came into contact with prestigious figures of the time including Poincaré (1854-1912), Bergson (1859-1941), Janet and Claparède (1873-1940), met on his frequent trips to Geneva. Right here, despite the oblivion in his homeland, Baldwin's approach on mental development found fertile ground in the young Jean Piaget, who in those years was under the influence of Claparède. Before he died, in Paris on November 8, 1934, at the age of 73, Baldwin worked on an autobiography published in 1926 entitled *Between Two Wars* (Baldwin, 1926).

In addition to his numerous publications, Baldwin had the merit of founding two psychology laboratories (Toronto and Princeton) and reopening the one at Johns Hopkins University in Baltimore. He was also among the founders of three major psychology reviews (Psychological Review, Psychological Bulletin, and Psychological Abstracts).

## 2. Development and evolution of the mind in Baldwin

### 2.1 - The Baldwin effect: the organic selection

As we have seen, in the last decade of the nineteenth century Baldwin engaged in studies on the evolution of mental faculties in children and on the close relationship of this type of development with that of the whole species (or race). *A New Factor in Evolution* (Baldwin, 1896a) represents an important step in the elaboration of his integrative theory on the development of the mind. Actually, it has been noted (Simpson, 1953; Continenza, 1982; Morgan & Harris, 2015) that Baldwin's ideas expressed in this article of 1896 are, to some extent, similar to those published independently in the same years by the psychologist CL Morgan (1896) and the biologist HF Osborn (1896), to the point that Baldwin included the works of the two authors in the appendix of his work *Development and Evolution* (Baldwin, 1902). Baldwin's approach focuses on the mechanism adopted by an organism (including humans) to respond - by adapting - to environmental challenges. This process can be interpreted from an ontogenetic point of view as the set of strategies and behaviours that individuals assume to survive during their existence. All these actions and habits produce behavioural modifications called "acquired characters", which Baldwin prefers to call - using a term derived from Osborn (1896) - ontogenetic variations, classifying them in three typologies. On the basis of the agents participating in them, they can be identified as follows: (1) "physical-genetic" agents, (2) "neuro-genetic" agents and finally (3) "psycho-genetic" agents. The latter are of particular interest in Baldwin's vision as they involve "intelligent" functions, such as imitation, maternal teachings, mechanisms of habit and accommodation related to the search for pleasure and the repulsion to pain, experience, and means-end reasoning. Baldwin introduces the expression

"Organic Selection" to indicate the way in which the growth and adaptation of individuals takes place, consisting in the acquisition of new ways or modifications of the adaptive function, together with its influence on the structure. Organic selection intervenes in the private life of the single organism, as it establishes whether the adaptations developed by such individual during its existence are successful, and, therefore, guarantee its survival and reproduction. Since only individuals capable of developing an adaptive behaviour survive, over the generations, what was an ontogenetic conquest of a single organism becomes a congenital ability to adaptation "stored" through heredity. Baldwin's theory can be summarized in the following passage:

*"The variations that have been used for ontogenetic adaptation in the previous generation, therefore being maintained, are more widely used in the next generation. "Congenital variations, on the one hand, are kept alive and made effective by their use for adaptations in the life of the individual; and, on the other hand, adaptations become congenital by further progress and refinement of variation in the same lines of function as those which their acquisition by the individual called into play." (Baldwin, 1896a, p. 447).*

One of the most significant points of Baldwin's theory of evolution lies in having recognized the importance of adaptability (*plasticity*) compared to the simple heredity of characters. In other words, success in life is guaranteed by the aptitude to experiment with new functions and methods, selecting the winning ones and eliminating the unsuccessful ones:

*"Organic selection opens a large sphere for the application of the principle of natural selection among organisms, i.e. selection on the basis of what they do rather than what they are; of the new use they make of their functions rather than of the mere possession of certain congenital features. A premium is set on plasticity and adaptability of function rather than on congenital fixity of structure; and this adaptability reaches its highest levels in the intelligence." (Baldwin, 1902, p. 117).*

Here Baldwin's attention focuses on those cases in which organic selection is "addressed" by intelligence:

*"Of all the variations that tend towards an adaptation, but inadequate to its complete performance, only those will be supplemented and kept alive which the intelligence ratifies and uses." (Baldwin, 1896b, p. 441).*

These considerations imply a proper reflection on conscious imitation and social heredity.

### 2.2 - Habit, accommodation and conscious imitation

In his more mature vision, Baldwin conceives intellectual development as an adaptation process in which two mechanisms operate simultaneously: habit and accommodation. According to this theory, each organism is endowed with a dynamogenic tendency which makes it to relate to external stimuli by acting on them. Habit involves repetition and retention of useful reactions; in fact, it represents the ability to repeat the actions that produced successful outcomes in the past. Initially, the organism has a congenital susceptibility to act according to modalities defined in relation to certain stimuli, until accommodation takes place, aiming at maintaining contact

with desirable stimuli (vital for the organism and capable of producing sensations of pleasure) and minimizing contact with undesirable ones (deadly or painful). Accommodation is, therefore, the “adaptive” process through which a habit is subjected to change in order to incorporate new possibilities of action. The modification of the action occurs through a “circular” process in which vital stimuli trigger either pleasure or pain; from here a burst of movements is generated, some of which are successful in causing either the repetition of the pleasant stimulus or the inhibition of the painful stimulus. Pleasure and pain are the criteria according to which movements are selected with the aim of making the organism adapt in the best possible way. Circular adaptation serves as a prototype for all higher forms of accommodation, including those involving the action of consciousness.

One of the imitative forms on which Baldwin’s attention focused is a particular type of circular reaction that he called “conscious imitation”. In conscious imitation, the movement *dynamogenically* caused by a stimulus not only tends to maintain contact with the stimulus but also to reproduce it because the imitative action reflects, to a certain extent, the stimulus itself. The reproduction of the stimulus enters consciousness as part of the next stimulus for the next action. Conscious imitation, therefore, tends to perpetuate itself in a circular sequence. The continued interaction of consciousness with reality and its stimuli ultimately provides the human mind with the possibility of gradually evolving towards a progressively more adequate adaptation to the real world depending on experience:

*“Conscious imitation, while it prevents the incidence of natural selection, keeps alive the creatures which have no instincts for the performance of the actions required, nevertheless does not subserve the utilities which the special instincts do. Accordingly on the more general definition of intelligence, which includes in it all conscious imitation, use of maternal instruction, and that sort of thing - no less than on the more special definition - we still find the principle of natural selection operative”* (Baldwin, 1896c, p. 561).

### 2.3 - The social legacy

In the human world, “social” phenomena such as care, education and examples provided by the mother in the early stages of life and the gradual achievement of self-sustenance activities are essential factors in the development of the individual (Baldwin, 1895b). Around the mid-1990s, the interaction between the developing mind of the child with the set of traditions, customs, habits deriving from his/her exposure to social life, had an increasingly central role in the scientific production of Baldwin (1895a, 1896a, 1897). Taking inspiration from *The Laws of Imitation* by De Tarde (1903), Baldwin elaborated an evolutionary vision of Social Hereditary, according to which the rules, the uses, the ideas of a generation can be transmitted to the next one creating an alternative hereditary mode, a legacy that he defines as “social”, which accompany the more widely recognized “physical” one. According to Baldwin, young organisms present imitative tendencies that allow them - through imitation, education or experience - to select some of the functions observed in surrounding individuals. This mechanism constitutes a form

of ontogenetic adaptation, as it contributes to the production of behavioural variations in the organism which favour its survival; it is, therefore, an application of the more general principle of organic selection. Social heredity keeps alive, by transmitting them from one generation to another, functions that are not yet, or will never become, congenital. Therefore, it represents an extra-organic transmission, a social alternative to natural heredity. The differentiation between the development of mental faculties in human beings and other species finds clear evidence in social heredity:

*“The child is the animal that inherits the smallest number of congenital coordination, but it is the one that learns the largest number”* (Baldwin, 1895a, p. 297).

With this affirmation, Baldwin wanted to underline the fundamental role played by intelligence in making human beings, in the early stages of life (which are in close correlation with his evolutionary process), capable of learning those features that natural heredity cannot pass down to them. We can therefore fully appreciate Baldwin’s vision on plasticity and intelligence: the extraordinary intellectual endowment of the child - which gives him a remarkable degree of plasticity - constitutes the evolutionary response of the human species to the scarce instinctual endowment compared to other species’ offspring.

## Conclusions

James Mark Baldwin went through periods of alternating fortune: from the great success achieved on the scene of the emerging American experimental psychology (suffice it to say that he was the author or recipient of a considerable number of books, publications, conferences, academic assignments and prestigious awards) to the Baltimore scandal and the inevitable “exile” in France and Mexico. However, Baldwin’s fame has gone through ups and downs even beyond his life: after decades of total oblivion, his theories on organic selection have re-emerged thanks to the work of a large number of researchers who, while trying to minimize their importance or even to deny their validity (Huxley, 1942; Simpson, 1953; Waddington, 1961; Mayr, 1963), had the merit to draw attention to the work of an author who had been too long forgotten. Perhaps, it is also thanks to these critical quotations that Baldwin’s vast scientific production had some unexpected publicity that led to the rediscovery not only of his theories in the biology field but also of his contributions to developmental psychology and genetic epistemology (Cahan, 1984; Morgan & Harris, 2015).

After having spent several years researching a reconciliation between mental philosophy and experimental psychology, Baldwin turned his attention to child psychology, discovering the inseparability of the development process of the mind in the child from its evolution in the species. This topic became so relevant that it pushed Baldwin to go beyond the sphere of the human mind and to extend his theories to all behavioural functions and all living species, including animals and plants. In a nutshell, the principle that Baldwin theorized consists in the transmission of the adaptations acquired in ontogenetic growth to individuals of future generations, with a consequent

abbreviation of the ontogenetic process (Baldwin, 1896a). In order to integrate his organic selection with the already complex panorama of evolutionary theories of his time, Baldwin expressly defined his vision as an alternative to Lamarck's theory on the hereditary nature of acquired characters, while embracing a modified version of natural selection (Baldwin, 1896a).

About half a century after *A New Factor in Evolution*, the representatives of Modern Synthesis (Huxley, 1942)<sup>1</sup> provided conflicting interpretations on organic selection, underlining that the existence of a causal relationship between accommodation and mutation would support - and not deny, as instead Baldwin sustained - Lamarck's theory (Simpson, 1953, p. 115) either by comparing it to the *genetic assimilation* of Waddington (Mayr, 1963) or by relegating it to a secondary role (Huxley, 1963). After another fifty years, the debate on which is the most faithful interpretation of Baldwin's evolutionary theory still arouses considerable interest (Weber & Depew, 2003; Continenza, 2006; Sánchez & Loredó, 2007; Crispo, 2007). The rekindling of interest in Baldwin's evolutionary theory is mainly due to the development of contemporary technology, which through powerful advanced calculation systems has made it possible to simulate what Baldwin was not able to demonstrate experimentally. One of the studies that had the merit of bringing Baldwin's thought back to light is undoubtedly *How Learning Can Guide Evolution* by Hinton and Nowlan (1987). The possibility of a retroactive interaction between environment and behaviour is one of the most appreciated aspects of Baldwin's theory in the contemporary debate (Deacon, 2003; Pertile, 2019).

The socio-cultural aspect of Baldwin's evolutionary theory has also been reconsidered today. Although equally subject to the organic selection process, social heredity provides a social alternative to physical heredity, thus finding fertile ground in those contexts where biological evolution and social and cultural evolution are considered as two different ways in which the evolutionary process unfolds (Wilson, 1975; Deacon, 2003; Morgan & Harris, 2015).

Even if the effect named after him is the driving force behind James Mark Baldwin's recurring "rediscoveries", the rekindling of the debate on the role of social relationships in cultural and social development seems to be proper reward for a scholar, psychologist and epistemologist, who was engaged for most of his life in the study of the mind and the construction of knowledge.

## Compliance with Ethical Standards

### Conflict of Interest

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<sup>1</sup> This expression is often used to indicate the modern genetic interpretation of Darwin's natural selection (1809–1882) and Gregor Mendel's theory of inheritance (1822–1884)

## Ethical approval

This article does not contain any studies with human participants performed by any of the authors

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