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John Bowlby and ethology : a study of cross-fertilization

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CHAPTER 1.

GENERAL INTRODUCTION

Roots of attachment theory

In the late 1950s and early 1960s, British child psychiatrist Edward John Mostyn Bowlby (1907-1990) in a series of six papers (Bowlby, 1958c, 1960a, 1960b, 1961a, 1961b, 1963a) basically formulated what is now known as 'attachment theory'. He later elaborated his ideas in his trilogy *Attachment and loss* (Bowlby, 1969/1982, 1973, 1980a). Attachment theory, in which Bowlby tried to explain how and why children form bonds with their parents and caregivers, has been influential ever since its initial formulation.

Bowlby's theorizing on the mother-child relationship was the ultimate result of his interest in issues of separation. In her description of Bowlby's early life, Van Dijken (1998) has shown that the roots of this interest lie in his own early childhood, in experiences while working as a volunteer in several progressive schools, and in clinical observations when training as a psychoanalyst shortly before the Second World War. Bowlby was shaped by the psychoanalytic training he received from his supervisors Joan Rivière (1883-1962) and Melanie Klein (1882-1960), but he held different opinions about the influence of internal and external factors on child development and clinical problems. Bowlby's focus was more on observation of real life events and experimentation, while Klein emphasized "research limited to analytic sessions" (Bowlby, 1940a, p. 154) and unconscious fantasies as the origin of psychopathology. As a result of this theoretical disagreement, Bowlby's position within the *British Psychoanalytical Society* at one point was rather precarious (Van Dijken, Van der Veer, Van IJzendoorn & Kuipers, 1998; Van der Horst, Van der Veer & Van IJzendoorn, 2007). But by ignoring what he considered limited views of some of his psychoanalytic colleagues and taking an eclectic approach instead, Bowlby arrived at new and revolutionary insights. In her study, Van Dijken (1998, p. 161) concluded that "by combining and synthesizing the various viewpoints he accepted, Bowlby gradually developed his own view," a view that "was enriched by ethological insights and by Ainsworth's contribution".

This thesis builds on Van Dijken's findings and describes the 'ethological insights' that enriched Bowlby's view on the mother-child relationship. Starting point of the current study is the publication of Bowlby's (1951, 1952) report on maternal deprivation for the World Health Organization (WHO) published in 1951 and the many different issues of separation that Bowlby reported in this study. It will be argued that, eventually, these results led Bowlby to ethology as a new theoretical approach that could explain his observations of (separation in) children. The influence of Bowlby's thinking will be discussed, as well as the broader influence of research by ethologists and animal psychologists. First, for a better understanding of what Bowlby sought in ethology, in the next paragraph an overview of the rise of ethology as a new discipline will be given.

The rise of ethology as a discipline

On December 12, 1973 the *Nobel Prize in Physiology or Medicine* was awarded to three scientists who had devoted their academic work to the study of animal behavior. Karl von Frisch (1886-1982), Konrad Lorenz (1903-1989), and Niko Tinbergen (1907-1988) were distinguished "for the creation of a new science – ethology, the biological study of behaviour" (Hinde & Thorpe, 1973). The word ethology, from the Greek *ήθος* (ethos) meaning character or custom and *λόγος* (logos) meaning word or description, has been traced back as far as

the seventeenth century, but its current meaning as the scientific study of (animal) behavior was only attributed to it in the first quarter of the twentieth century (Jaynes, 1969). According to Lorenz (1981, p. 1)

> [e]thology, the comparative study of behavior, is easy to define: it is the discipline which applies to the behavior of animals and humans all those questions asked and those methodologies used as a matter of course in all the other branches of biology since Charles Darwin's time.

Until the beginning of the previous century animal behavior was explained by using the concept of 'instinct', though there was no clear description or understanding of what that concept implied. In *On the origin of species* (1859), Charles Darwin (1809-1882) already used the term as one of the pillars of evolutionary theory: instinct was a characteristic that was influenced by natural selection just as morphology was. Instincts had to be adaptive to give the organism an advantage in its environment. After Darwin though, the analogies between animals and humans were mainly studied by (comparative) psychologists in an effort to understand the behavior and psyche of animals. It was presumed, for example by behaviorists, that the regularities found in animal behavior hold for humans as well. In their studies evolution and adaptivity to the environment were largely ignored. It was only during the 1920s that zoologists put evolution and adaptivity of instincts back on the agenda. The people responsible for this change of focus, the forerunners of ethology, were Whitman and Craig in the United States, Selous and Huxley in Britain and Heinroth in Germany (Roëll, 2000; Kruuk, 2003; Burkhardt, 2005).

Charles Otis Whitman (1842-1910) was an American biologist who, just as many other ethologists *avant la lettre*, was fascinated by animal life and ornithology from an early age. He advocated a broad approach to biological research, including observation and experimentation. His basic assumption in interpreting behavior was that "instinct and structure are to be studied from the common standpoint of phyletic descent" (Whitman, 1899 in Roëll, 2000, p. 28). Animal habits should thus be studied in the same scientific manner that anatomy and morphology were and behavior should be seen from an evolutionary viewpoint. Whitman's influence on European ethology was mainly indirect through his student Wallace Craig (1876-1954), who corresponded extensively with Lorenz between 1935 and 1937 on Whitman's ideas. This new approach to the study of 'instinct' made no headway in the United States in this early period though (Roëll, 2000; Burkhardt, 2005).

In Europe, the new study of instincts and animal behavior did find fertile soil. In England, naturalist Edmund Selous (1857-1934) followed Whitman's scientific tradition of studying animals: "the habits of animals are really as scientific as their anatomies" (Selous, 1905 in Burkhardt, 2005, p. 92). Selous was praised by colleagues for his detailed observations of bird behavior. His pioneering work inspired Julian Huxley (1877-1975) in England and Tinbergen's mentor Jan Verwey (1899-1981) in the Netherlands to do field studies of their own (Roëll, 2000). In Germany Oskar Heinroth (1871-1945) had great influence on the development of ethology as a scientific study through his close contacts with Lorenz. Heinroth was director of an ornithological field station and was fully devoted to

making descriptions of bird behavior. In the 1930s, he and Lorenz had much contact on comparative studies of behavior; eventually it was Lorenz who would lay the theoretical foundations for their new approach (Roëll, 2000; Kruuk, 2003; Burkhardt, 2005). Lorenz attributed the founding of ethology to the decisive discovery made by Whitman, Heinroth and himself "that movement patterns [of different species] are homologous" (Lorenz, 1981, p. 3). From that time the study of behavior was approached in the same manner as the study of morphology of animals was. In the following years, Lorenz as the theorist and Tinbergen as the more empirically-minded researcher would lay the foundations of this new discipline.

Lorenz and Tinbergen first met at a symposium on the concept of instinct in Leiden in November 1936. They had started corresponding the year before and Tinbergen used Lorenz's (1935) very influential work *Der Kumpan in der Umwelt des Vogels* in courses he taught at Leiden University (Roëll, 2000). After their first meeting, both men felt that they were personally and intellectually connected, especially because the work of the one so wonderfully complemented that of the other. According to Tinbergen (1974, p. 198): "Lorenz's extraordinary vision and enthusiasm were supplemented and fertilised by my critical sense, my inclination to think his ideas through, and my irrepressible urge to check our 'hunches' by experimentation". In the year following their first encounter Tinbergen would spend some months at Lorenz's home in Altenberg where they carried out simple experiments with various animals. Their subsequent friendship was to be decisive for the development of ethology as a new approach. Here we will discuss this development from the mid-1930s to the early 1950s – approximately the time Bowlby's attention was first drawn to its relevance for studies of human behavior – by briefly discussing Lorenz's (1935) *Der Kumpan* and Tinbergen's (1951) *The study of instinct*. These works give a far from complete picture of ethology, but they do account for the ethological notions Bowlby was provided with. It was the English translation of *Der Kumpan*, published in the American ornithological journal *The Auk* (Lorenz, 1937), that set Bowlby on track for his interest in ethology as a framework for his ideas on separation in 1951 (Bowlby, 1969/1982, p. xviii; Bowlby, Figlio & Young, 1986; Ainsworth & Bowlby, 1991; Hinde, 2005). Tinbergen's *The study of instinct* appeared in the same year as "ethology's first major text" and "a benchmark for how far ethology had come" (Burkhardt, 2005, p. 371). Bowlby's attention was immediately drawn to it (Van der Horst et al., 2007).

Lorenz's *The companion in the bird's world*

Lorenz's main contribution to ethology is the formulation of several key concepts in his most influential work, *Der Kumpan in der Umwelt des Vogels* (Lorenz, 1935), later translated into English as *The companion in the bird's world* (Lorenz, 1937). It was basically Lorenz's attempt to summarize his ideas up to that point and to provide others with a theoretical framework for comparative research of animal behavior. It came to be regarded as an impressive and authoritative work, receiving very favorable reviews in the United States and England, from American psychologist Margaret Morse Nice (1883-1974), Craig, and Huxley amongst others. One could say that Lorenz earned himself an international reputation with its publication.

Der Kumpan made use of many concepts that had earlier been introduced by German physiologist Jacob von Uexküll (1864-1944), with whom Lorenz cooperated closely in the 1930s. The central concept in *Der Kumpan* is the 'social releaser', a stimulus that elicits instinctual behavior (more specifically those features of a fellow member of the same species an animal reacts to). Lorenz assumed that lower animals such as birds are not adapted to their environment by learned behavior – as humans are – but that they make use of differentiated instinctive behavior patterns. These patterns have been built up during evolution because of their survival value. These instinctive behaviors only have to be 'released' or triggered by the environment. The reaction to a specific releaser is laid down in an 'innate releasing mechanism' (IRM) in the organism. The structured pattern of movements that follows a releaser is called a 'fixed action pattern' (FAP). This is the genetically programmed core of a species typical behavior, it is a highly stereotyped innate movement pattern based on activity in a specific coordinating centre in the central nervous system. A FAP runs to completion regardless of further stimulation. With these concepts, Lorenz linked external stimuli with the internal, innate behavior patterns of the animal. In an animal's social life Lorenz identified several releasers of instinctual behavior, so-called *Kumpane* or companions: the parent-companion, the child-companion, the sex-companion, the social-companion and the brother-and-sister-companion. Lorenz's description of the IRM made it possible to make a clear distinction between instinctual and learned behavior (Lorenz, 1935, 1937; cf. Roëll, 2000; Burkhardt, 2005; Hinde, 2005).

Probably the most interesting concept Lorenz described in *Der Kumpan* was a phenomenon that was neither instinctive nor learned. Lorenz narrated how young graylag goslings (*Anser anser*) and jackdaws (*Corvus monedula*) do not recognize members of their own species directly after birth, but show a strong following response to the first moving object in their surroundings. He named this response 'imprinting'. The concepts of imprinting, companion, and releaser are closely related: because the animal does not instinctively recognize members of its own species, imprinting provides it with this information in a sensitive period directly after birth. In this sensitive period a preference for members of the own species is established and hereby companions in the environment become able to elicit instinctive behaviors (Lorenz, 1935, 1937).

Tinbergen's *The study of instinct* and the four whys

In 1951, the year Bowlby first turned to ethology, Tinbergen published his seminal work on *The study of instinct*, in which he described the state of the art in ethology. Though published while working at Oxford University, the book is a reflection of Tinbergen's ideas and research from his time in Leiden and "an extension of a series of lectures delivered at New York in February 1947" (Tinbergen, 1951, p. v). *The study of instinct* was of great importance to the field as "it was this book that put ethology on the map" (Kruuk, 2003, p. 149). Central in Tinbergen's book are the 'four whys' or four questions regarding the behavior of animals. These four questions related to the causation, the ontogeny, the function, and the evolution of instinctive behavior. Tinbergen's focus was the question of the causation of innate behavior, mainly because to that point it had been the focus of research by him, Lorenz, and others.

To understand the causes of innate behavior, Tinbergen proposed a hierarchical organization of instinctive behaviors. Tinbergen also differentiated between influences on the behavior of the organism by external factors (such as sensory stimuli or sign stimuli) and internal factors (what Tinbergen called "physiological mechanisms": e.g. hormones, internal sensory stimuli, and intrinsic or automatic nervous impulses generated by the central nervous system). He stated that the internal factors controlled the motivation of the organism and the so-called appetitive behavior (e.g., looking for food or courtship patterns prior to mating). Also, the internal factors determined the threshold needed to release the instinctive behavior. But the behavior is not elicited without external factors unblocking the IRM and releasing the actual consummatory act (as laid down in a FAP). Tinbergen (1951, p. 103) exemplifies this reasoning with an account of the reproductive behavior of the male three-spined stickleback (*Gasterosteus aculeatus aculeatus*):

> In spring, the gradual increase in length of day brings the males into a condition of increased reproductive motivation, which drives them to migrate into shallow fresh water. Here… a rise in temperature, together with a visual stimulus situation received from a suitable territory, releases the reproductive pattern as a whole. The male settles on the territory, … it reacts to strangers by fighting, and starts to build a nest. Now, whereas both nest-building and fighting depend on activations of the reproductive drive as a whole, no observer can predict which one of the two patterns will be shown at any given moment. Fighting for instance, has to be released by a specific stimulus, viz. 'red male intruding into the territory'. Building is not released by this stimulus situation but depends on other stimuli. Thus these two activities, though both depend on activation of the reproductive drive as a whole, are also dependent on additional (external) factors. The influence of these latter factors is, however, restricted, they act upon either fighting or building, not on the reproductive drive as a whole.

In this example the reproductive behavior is the appetitive behavior that builds up due to internal factors and leads to a decrease of the threshold. The instinctive behavior, though, is only elicited by external factors (e.g., a male intruder) and this external stimulus unblocks the IRM and results in a FAP (namely fighting). The behavior itself takes away the motivation for the animal to strive for the stimulus. The hierarchical coordination of different IRM's results in suppression of other behavioral systems when a specific behavioral system is activated. In some instances, different and conflicting drives are activated (e.g., fleeing and fighting). In these cases displacement activities may occur (such a nest building or courting behavior towards a male intruder).

The topic of the causation of behavior took up more than half of the book. Tinbergen touched upon the three other questions, but in much less detail. Nevertheless, *The study of instinct* is generally seen as the work that "brought order in the perceived chaos of behaving animals" (Kruuk, 2003, p. 149) and that explained animal behavior in all its dimensions. Its huge impact was mainly due to Tinbergen's all-embracing approach. Later,

many of his ideas were dismantled and would be replaced with new concepts and views, but for the time being Tinbergen had made ethology count.

Sources of information

The findings in this thesis are based on many different sources. Of course, we relied heavily on the original writings of Bowlby and many of the ethologists he interacted with. Also, experts of attachment theory (e.g., Robert Hinde, Stephen Suomi, Joan Stevenson-Hinde, Howard Steele, Everett Waters, and Inge Bretherton) were willing to be interviewed on the cross-fertilization of ethology and attachment theory, each addressing the issue from their own expertise and perspective. Another important and very rich source of information were archival materials, mainly located at the Wellcome Library for the History and Understanding of Medicine. The Archives and Manuscripts section there holds Bowlby's personal archive since the death of Bowlby's wife Ursula in 1999. Harry Harlow's personal papers were available through Helen LeRoy, who has been very helpful in providing us with his correspondence and was willing to be interviewed on Harlow's role in attachment theory as well. Others were kind enough to provide us with some of Bowlby's correspondence (e.g., Adriaan Kortlandt, Joan Stevenson-Hinde). Of great value were the issues of the *British Medical Journal* and *The Lancet*, which contained several of Bowlby's letters but also many articles and letters by his colleagues in the medical world who reflected upon his work.

Aims of the current study

The general aim of this thesis is to describe the cross-fertilization of attachment theory and ethology. The study has three specific aims:

1. to describe the several different issues of separation that Bowlby reported in his report for the WHO and that could not be explained with the psychoanalytic ideas that he had been familiar with to that point;
2. to give an account of the importance of ethology as a new framework for Bowlby to explain mother-child interactions in early life and (more specifically) the role Robert Hinde played in this regard;
3. to narrate the interaction between John Bowlby and Harry Harlow and the importance of the empirical evidence provided by Harlow's studies on separation in rhesus monkeys.

Outline of the present thesis

The outline of this thesis is as follows. In *Chapter 2* different issues of separation of young children that Bowlby encountered during the late 1930s, 1940s, and early 1950s are discussed. These issues include separation due to war-time evacuations, observations made in residential nurseries, the discussion concerning visiting of children in hospital, results of clinical studies, and studies on the so-called 'hospitalization' effect. This description of "unexplained observations" is followed by an account of the cross-fertilization of ideas of Bowlby and various leading European scientists in the field of ethology in *Chapter 3*. From the 1950s Bowlby was in personal and scientific contact with the likes of Tinbergen, Lorenz and Hinde and he used their new viewpoints and theoretical framework to explain his earlier observations and to construct his new theory on attachment. These ethologists in

their turn were influenced and inspired by Bowlby's thinking. Attention will be paid to Bowlby's influence on ethological studies in general and on Robert Hinde's work more specifically. After a short intermezzo, *Chapter 4* will show how Bowlby made the move from theoretical claims to empirical evidence through his interactions with American animal psychologist Harry Harlow, with whom he was in close contact from 1957 through the mid-1970s. Bowlby profited highly from Harlow's experimental work on the effects of separation in infant rhesus monkeys. Here again, an attempt is made to delineate the cross-fertilizing aspect of the interaction by showing that Harlow in his turn was influenced and inspired by Bowlby as well. *Chapter 5*, based on interviews conducted with Harlow's student and attachment expert Stephen J. Suomi, is an comprehensive illustration of the influence of ethology and animal research on attachment theory in recent studies and vice versa. Finally, in *Chapter 6* the evidence presented in this thesis will be integrated and discussed. Here we will address the issue of Bowlby's scientific descent: was it Freudian or Darwinian?