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KIN SELECTION AND INCLUSIVE FITNESS IN EVOLUTIONARY BIOLOGY AND PSYCHOLOGY PART I. COULD THEY BE RELATED TO NEW TESTAMENT EXPLANATIONS OF ALTRUISTIC BEHAVIOUR?

George Varvatsoulias*

West London Mental Health NHS Trust, Recovery East Team, Clinical Psychology, Avenue House, 43/47 Avenue Road, Acton, London W3 8NJ, UK

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Abstract

This paper examines the theories of inclusive fitness and kin selection and their relationship to New Testament considerations of cooperation and altruism. It discusses how these theories have been developed and what they represent in Evolutionary biology and Psychology.
In Part I, the central concept in these theories is the idea of altruism or, in most cases, cooperation and reciprocity. In Evolutionary biology, these terms refer to favours bestowed upon individuals belonging to the same kin (e.g. kin selection). In evolutionary psychology, they refer to a caring disposition demonstrated to members of non-kin as well (e.g. reciprocity). In Evolutionary biology, altruism occurs so that the altruist's genes may passed on to the progeny of relatives.

Keywords: inclusive fitness, kin selection, group selection, exaptation, altruism

1. Introduction

The theory of kin selection is widely accepted as one of the major theoretical ideas of the evolutionary approach to explain why individuals behave altruistically toward kin members [1]. Inclusive fitness refers to favouring those related progeny who carry genes similar to the altruist's [2]. Kin selection [3] is based on Hamilton's [4, 5] concept of inclusive fitness, where it is explained that genes responsible for altruistic acts toward kin members could actually be costly to the donor's personal reproductive success [6].

*E-mail: gvarvatsoulias@gmail.com

Kin selection explains cooperative relationships between close relatives. Such relationships depend on altruistic and cooperative dispositions between actors and recipients [7]. Altruism requires an actor to provide favours to a recipient at the personal cost of reproductive fitness. Such behaviours, though not acceptable in evolutionary psychology explanations such as the social exchange theory, are quite possible when actors and recipients are closely related (e.g. parents and children, siblings or nieces and nephews) [8]. Consequently, kin selection allows for more progeny of close relatives who are genetically related and thus maximizes fitness by enhancing the altruist's genes that are transmitted to related generations. This process is inclusive fitness where altruistic acts are directed to members of the same kin [9]. Inclusive fitness theory shows that transmission of genes can be favoured if kin-favouring behaviours are selected to enhance the fecundity of genetically-related individuals [10].

Altruistic behaviours toward kin benefit specific individuals and the fecundity of one's extended family [11]. In this way, kin selection proves to be a stable cooperative strategy between relatives so that needs are met with the best possible benefits and least possible costs [12]. In kin selection relatedness between individuals is known, whereas inclusive fitness refers to genes that are shared by a group of individuals without knowledge of relatedness [13]. Kin selection can be incorporated into wider evolutionary concepts such as group selection, or cultural evolution of altruistic acts directed toward non-kin. These may also have a costly impact to donors such as self-sacrifice for the sake of another's wellbeing [14].

In this paper, we will discuss kin selection and inclusive fitness in light of Evolutionary biology and Psychology. The aim of this study is not to oppose Evolutionary biology and Psychology, but to establish a link between the two and the writings of the New Testament on the issue of altruism. Parts to be discussed will be as follows: a) Kin selection and inclusive fitness from an evolutionary biological perspective; b) Kin selection and altruistic behaviour in an inclusive fitness framework; c) Kin-favouritism – greenbeard altruism; d) William Hamilton's mathematical formula for altruism; e) Kin selection and inclusive fitness in an evolutionary psychological perspective; f) Alternative evolutionary psychological explanations for kin selection and inclusive fitness: 1f) Kin selection: Group selection incorporated? 2f) The exaptation effect of inclusive fitness theory (will be published in a subsequent issue of EJST as Part II); g) Altruistic behaviour explanations offered in the New Testament.

The above considerations of inclusive fitness and kin selection will be discussed to understand altruistic behaviour in New Testament terms. The way these theories help explain altruism depicted in the New Testament may shed light on how altruistic behaviour spread in the early Christian Church so that the needs of underprivileged and weak members could be satisfied.

2. Kin selection and inclusive fitness from an evolutionary biological perspective

Kin-selection in Evolutionary biology refers to the survival of genes in relatives at the expense of a donor's survival [3]. It takes place between blood-relatives and promotes the fitness and wellbeing of same-kin individuals (e.g. a father who gives his kidney to save the life of his child or a nephew/niece) [15]. Kin-selected altruism was explained by Hamilton [3] as the bearer's genetic disposition to help a close relative as long as the cost to the actor is less than the benefit to the recipient multiplied by the degree of relatedness. In such a way, a donor's genes will be replicated in the population even if that means that the carrier's survival or reproductive success could be put at stake [16].

Kin-selection is regarded as synonymous to inclusive fitness [17-19]. Kin-selective behaviours require an actor and a recipient; thus, genetic relatedness between two individuals is a precondition for kin selection to operate [20]. Inclusive fitness is the mathematical explanation of kin selection. It is the explanation of how cooperative behaviours between members of the same kin have come to exist [21]. In inclusive fitness terms, what an individual does cooperatively to favour members of one's own kin actually enhances the survival of the donor's genes in the environment in future generations [22, 23]. Kin selection has been successful in explaining a variety of complicated biological phenomena, such as issues of sterility in eusocial insects and avoidance of cannibalism in salamanders [5, 24]. Kin selection together with the concept of inclusive fitness, are central to evolutionary theory [25]. If the environment permits those genes promoting altruistic tendencies to continue flourishing in subsequent generations, then natural selection acts upon inclusive fitness to promote such behaviours [26]. "The inclusive-fitness concept is more general than kin selection [because] "kinship is just one way of getting positive regression of genotype in the recipient, and that it is this positive regression that is vitally necessary for altruism" [27]. Inclusive fitness consists of direct fitness – the effect of fitness on the individual carrying the allele – and indirect fitness – the effect of fitness on other individuals carrying the same allele [25].

Those 'altruism genes' in kin selection, refer to favours directed to relatives. This increases inclusive fitness, for the more one's genes are shared with relatives, the more one shows preference in helping those relatives [17]. Inclusive fitness promotes kin selection due to the survival of genes via the reproduction of related individuals [28] by encouraging altruistic behaviours between them [29]. Natural selection then allows organisms to replicate their genes in future generations [30]. That means that the replication of genes is more important than the reproduction of individuals [4, 5, 30]. In such a way, it is suggested [31] that inclusive fitness is not a sole property of individuals, but a representation of an effective accumulation of genes underlying altruistic behaviours. A gene that produces altruistic actions can benefit copies of itself to be located in related progeny throughout the population [32].

What enhances the persistence of inclusive fitness is the connection between genetic kinship and altruism [33]. Altruistic acts between relatives are not detrimental to individuals [34], but enhance fitness amongst the group members. Inclusive fitness is increased through genes which copy themselves in related progeny [5]. Genes can be thought of as 'replicators' and individuals as 'vehicles' who carry the gene copies [35]. In Dawkins's explanation, it is genes that have fitness and organisms are enhanced by those genes that allow reproductive success where replicas of the genes themselves are found in related progeny. If certain genes contribute to cooperative behaviour, including altruism, such that the ones having those genes are more reproductively successful, then the co-operators enhance their inclusive fitness in the population [5].

An aspect worth noting is that identical genes in unrelated individuals do not 'feel' the presence of each other [32]. Thus Hamilton's rule may have a wider application to cooperation, and even altruism, as a behavioural trait even amongst unrelated members of a group [36]. Inclusive fitness, then, is a broader concept not necessarily synonymous to kin selection. Mealey argues that altruistic behaviours do not refer to an overall genetic or phenotypic similarity, but to the likelihood that a gene for altruism is present at a particular locus of a chromosome and not at multiple loci [37]. If valid, the probability of a gene being present in other individuals does not exclusively mean that individuals must be genetically related in order to behave altruistically to one another; instead, they would only need to have a gene at one of its loci to foster cooperative or even altruistic actions [38].

3. Kin selection and altruistic behaviour in an inclusive fitness framework

Kin selection refers to the process through which cooperative and even altruistic behaviours have evolved to favour the fitness of genetic relatives [39]. In kin selection, these behaviours are explained as cognitive and behavioural choices promoting the survival and welfare of related individuals [40]. The assumption is that cooperative and altruistic behaviours are directed toward those who share genes via common descent [29].

Cooperation and altruism are important for kin selection [41]. Cooperative and sacrificial behaviours between kin enhance chances of survival (e.g. protecting offspring from predators) [42]. Kin selection hypothesizes that species, both human and non-human, have evolved to favour members of their own kin [5]. Thus individuals are more likely to cooperate and perform altruistic acts towards close genetic relatives than toward distant relatives or non-kin [2, 43]. Ground squirrels and prairie dogs, for instance, put themselves at risk by uttering alarm sounds, warning others of predators. Predators are distracted, however, at the cost of the caller's life who is spotted and attacked [30, 36]. A number of studies have shown [44-46] that alarm calling takes place when prairie dogs have members of their family in the colony that are under danger. However, the cost of alarm calling does not always mean that certain

attack is underway. It may also mean that consequences following the attack - such as deaths - would bring about severe outcomes to the colony in terms of reproduction reduction and fitness minimization. Animals that display altruistic behaviours suffer costs but provide benefits favouring relatives [30]. Altruistic acts suggest that individuals are 'nepotistic strategists' both towards offspring and kin [30]. Daly and Wilson argue that, nepotism epitomizes the inclusive fitness concept in terms of kin-favouritism, where individuals bestow favours upon members of their own kin. Natural selection favours reproductive efforts when cooperation and altruism is practiced between related individuals [30].

Individuals possessing genes for kin altruism means that: a) kin altruism is a species-typical adaptation pertaining to kin-based relationships [47]; and b) kin altruism has become an evolutionarily stable strategy for kin selection theory and a rigorous explanation for the inclusive fitness concept [29]. The concept of inclusive fitness embraces kin selection and altruistic behaviour in two ways: a) by explaining altruistic acts on the grounds of kin-relatedness [29]; and b) by pointing out the importance of the replication of altruistic genes, despite the fact that such replication could be damaging to bearers [16]. Altruistic behaviour can take place between unrelated individuals due to environmental needs, such as living under the same roof, having spent much time together, or caring for each other [32]. In this way, altruistic acts are subject to the environment affecting cognitive processing of informational inputs that suggest genetic relationship [48, 32]. Examples of this include non-siblings reared in the same household who cooperate or even sacrifice altruistically for each other [48].

4. Kin-favouritism – greenbeard altruism

Kin-favouritism is a form of 'genic self-favouritism' [49], where the enhancement of a gene's replication in non-kin is pursued [32]. Any gene incorporating altruistic acts renders its bearer capable of recognizing copies of it in others and may influence relationships not only between kin, but also between non-kin [50, 28]. In other words, altruistic genes may be shared by individuals regardless of any sense of kinship [27].

Genic self-favouritism is also related to 'greenbeard altruism', a term coined by Richard Dawkins [35]. Greenbeard altruism refers to altruistic acts directed to individuals exhibiting the 'green beard' phenotype – a hypothetical one – which makes them easily recognizable [32]. Conversely, a 'green beard' phenotype does not necessarily mean it is trustworthy; it may be an act of deception in order for fakers to be treated altruistically [35]. If such is the case, genic self-favouritism could also be costly if it proves beneficial for the recipient but not the actor, since it takes place in the absence of kinship [32].

Though such a phenotype can be perceptibly observed in individuals – in reference to traits some individuals have but not others - what Dawkins wishes to illustrate with this colourful metaphor is that individuals, irrespective of whether they come from the same kin, tend to favour individuals bearing

phenotypes perceptibly the same as themselves. By saying 'phenotypes the same as themselves' I mean any kind of phenotype, such as red hair, speaking the same language, being disabled, coming from the same country, having the same religion, etc. [51]. It can be firmly argued that individuals totally unrelated to each other, when they come in contact with individuals exhibiting the same phenotypes as themselves, can easily become affiliated to one another.

5. William Hamilton's mathematical formula for altruism

Hamilton [5] proposed a formula ($c < rb$), known as Hamilton's rule, where he explained the cost 'c' to an altruist as sufficiently small compared to the benefit 'b' to a recipient. Altruistic acts account for the degree of relatedness 'r' where two individuals share genes by common descent, yet not for the degree of an overall genetic similarity [37, 32]. The coefficient of relatedness of the recipient to the bearer indicates the probability a gene for altruism to be commonly present in both the recipient and the bearer [38]. As a result, altruistic behaviours resulting from such a relationship will provide a clear advantage in fitness to the gene [5]. An individual with a gene predisposing him/her to offer help to a relative means that every time a relative is assisted, a copy of the altruistic gene that his/her relative is carrying is also benefited [52]. For instance, two siblings share 0.5 (50% each) coefficient of relatedness because they have inherited two alleles from one, or the other parent [32]. Individuals carrying the same allele are known as 'relatives' [38]. Inheritance is decreased between distant relatives, such as half-siblings 1/4, or first cousins 1/8 [32]. The more two individuals are genetically related, the more the genes they share for altruism will be common by descent [29].

6. Kin selection and inclusive fitness from an evolutionary psychological perspective

Evolutionary psychologists and biologists tend to be highly supportive of the theories of kin selection and inclusive fitness [53, 54]. In evolutionary psychology both these explanations are mainly seen under the prism of altruistic behaviours [55]; in Evolutionary biology the focus is more on genetic inheritance [56]. In evolutionary psychology, kin selection explains altruism and cooperation in terms of adaptation to hostile environments [57]. Altruistic and cooperative behaviours in the EEA (Environment of Evolutionary Adaptedness) functioned in the survival of communities, whereas individual reproductive success was dependent on the entire community's survival and continuity in the future. Altruistic and cooperative behaviours, in other words, were seen as parallel to fitness maximisation purposes to enhance reproductive activity [58]. Altruistic and cooperative behaviours were part of the establishment of societies for both kin as well as non-kin. Kin-related altruism was not regarded in a confined sense, or in contrast to the needs of non-kin individuals, because maintaining the society was critical for survival of all its

members [59]. Non-kin selected altruism and cooperation would occur after disrupting incidents: death, social upheaval, physical disaster, or resource-driven conflicts between members of the same or different communities [60]. In this setting, members of other families, if left as orphans, were cared for or even adopted in order to survive and prosper. Survival and prosperity for underprivileged individuals via altruistic behaviours by non-relatives was an important pattern of behaviour which mitigated future conflicts between different social classes [61]. Kin selection, in evolutionary psychological terms, explains such patterns of behaviour via altruistic and cooperative acts to enable the learning of such traits as conscientiousness, agreeableness and openness to others [62].

Inclusive fitness, from an evolutionary psychological perspective, agrees with the explanation of the survival of kin-related genes in future progeny; but it goes beyond this focus.. Inclusive fitness is not merely biologically explained [63], but it can also be regarded under the prism of human motivation for purposeful behaviours in order to maintain relationships and social balance [53]. Relationship maintenance and social balance can be achieved through the principle of inclusive fitness [64]. What evolutionary psychology studies by connecting relationship maintenance and social balance to inclusive fitness, is that motives are important too: humans have cognitive structures to satisfy personal needs via the implementation of particular social behaviours, such as recognition via cooperation and acceptance via tolerance [65]. The way inclusive fitness is demonstrated among members of kin, or towards members of non-kin, explains that altruistic and cooperative behaviours lie at the core, not only of genetically-related individuals, but also toward non-kin unrelated members of the group [66]. Consequently, inclusive fitness depends on the motivation that individuals exert via cooperative and altruistic attitudes exhibited to enhance relationship maintenance and the upkeep of social balance [67].

There are at least five domains where evolutionary psychology could enhance inclusive fitness in terms of relationship maintenance and social balance [68]: a) the protection of oneself from external dangers, such as dealing with potential predators; b) the importance of reproduction and fertility in terms of increasing intimacy; c) the need for balanced relationships between families, or social members, in terms of stability and reciprocity; d) the need for coalition strategies between non-kin individuals in terms of getting-together to detect and face free-riders and cheaters; and, e) the needs individuals to imitate one another in cultural environments, so to gain appreciation. The importance of inclusive fitness, according to these five domains, for evolutionary psychology refers to: a) self-preservation and sustainability issues as to the cognitive impact of one's relationship to others and the environment in terms of enhancing collaboration and reducing exploitation; b) the value of reproduction success in terms to mating strategies as to emotional give-and-take repercussions, such as honesty in feelings and promotion of togetherness; c) family and society in terms of being linked and working together for the benefit of genetically and

non-genetically related individuals; d) the application of interrelatedness in terms of social progress; and e) the cultivation of culture for the wellbeing of both individuals and the society.

The connection between evolutionary psychology and inclusive fitness takes place in parallel with the needs individuals attempt to personally fulfil, living in a given environment, and the needs societies attempt to meet so individual lives may be improved [69]. Inclusive fitness in a wider evolutionary sense may include accumulation of resources and providing them to those one is connected to, such as passing down personal goods to one's heirs [70]. Accumulation of resources in evolutionary psychology is a cognitive pursuit of wellbeing. On the one hand, those to whom resources are distributed will be able to thrive and prosper; on the other, the inclusive fitness of the actor's genes will be enhanced provided the heirs live well enough to reproduce more effectively [10]. "Fitness" may also include changes in cultural practices. Maximization of inclusive fitness does not only have an evolutionary value in terms of reproduction and passing on of genes, but also in terms of modified cultural processes that allow the entire population to flourish via future generations [71]. Such cultural processes refer to rules of behaviour including rituals, representations people appreciate more (e.g. real ideas compared to mythical ideas), artefacts of past civilizations (e.g. monuments, and concrete by-products of the human mind including literature, music, art and drama) [72, 2]. Here, 'fitness' includes cultural practices that allows for stability, continuity and adherence; 'inclusion' in these practices realizes that they have been selected for to represent not only particular individuals, but also communities and societies [73]. Inclusive fitness is therefore closely related to the human mental capacity in terms of its evolutionary history and use throughout the past. Inclusive fitness in this way can be associated with the cognitive elements of the human mind in terms of creativity, trial-and-error efforts, cause and effect processes, as well as with issues of individual contribution to the changes taking place in human history and the human involvement in the affairs, needs and expectations of the inhabited world [74].

7. Alternative evolutionary psychological explanations on kin selection and inclusive fitness

Hamilton's theory of kin selection explains kin relations, but not non-kin interactions. Hamilton's theory of kin selection underwent a number of criticisms. The most influential was the *evolution of reciprocal altruism* by Trivers [75]. (This term is somewhat oxymoronic and should be simply called *reciprocity* since the sacrifice required in altruistic acts is not required.) Non-kin 'altruism' in the form of reciprocity was suggested by Trivers [75] as complementary to Hamilton's theory [76]. Trivers's 'reciprocal altruism' suggests that favours between non-relatives can be exchanged (e.g. an individual helping an unrelated other, who is hungry, by offering him/her spare food) [15]. This type of non-kin reciprocity may be due to genes that predispose

its carrier to help a like-minded individual to prosper. Trivers even allowed the costs to be more to the giver than the benefits he/she expects to receive in return [75]. Hamilton [77] disagreed with Trivers, for in Hamilton's attempt to identify and explain biological altruism he had cautiously excluded anything resembling reciprocation. In his opinion he did that because "a donor always expects to benefit itself, at least in the long-term" [77].

On the other hand, inclusive fitness theory has also been criticized on the grounds of the assumption that it does not address the proximal causes of altruism. It was suggested that "emotional closeness could be employed as a mediator of the effect of genetic relatedness on altruistic behaviour". Research has shown that emotional closeness is an important proximal cause of altruism partially mediating the consequence of genetic relatedness of one's disposition to behave altruistically. The latter suggested that individuals were more willing to act altruistically toward their spouses, compared to others with whom they were genetically related [78, 79].

7.1. Kin selection: Group selection theory incorporated?

The above 'clash of minds' between Hamilton and Trivers as to the evolutionary meaning of kin selection is not the only one [80]. It has been explained in relation to individual selection [81], interpreted as an idea for universal altruism [82], and regarded as an explanation for group selection or also that it derives from it [83, 84]. I next explore the relationship between kin selection and group selection since both have to do with choices people make to help, in an altruistic manner, salient others whether those others relate to one's own kin or not.

Altruistic traits were first assumed to be due to a type of inter-population selectiveness since they refer to the evolution of behaviours able to favour individuals of both kin and non-kin descent within a defined group [85]. That assumption gave rise to approaches to altruism in terms of group selection where altruistic and cooperative behaviours take place for the benefits of individuals and societies alike. What we have previously referred to as 'green-beard altruism' has its parallel here. In group selection, green-beard altruism explains everyone's helping behaviours towards others who may also have that same kind of phenotypic trait [86].

Group selection explains the assumption that individual selection is favoured by everyone participating in resolving each other's difficulties, whether these may be physical or psychological [87]. In group selection terms it is not necessarily genetic inheritance that is involved. Consequently, group selection is behaviourally conditioned to help underprivileged individuals [88, 89]. In this way, needy individuals will be helped even by those with whom there is no direct relatedness. This process of group-selection has been explained as an unconscious one (i.e. an automatic desire to bestow favours upon deprived and disadvantaged others) [90]. In group selection theory, kin selection is included as a functional part [91].

For kin selection to function as part of group selection theory, a re-consideration of Hamilton's formula ($c < rb$) that conceptually included a 'rare gene' for cooperation and altruism was needed. That concept was 'green-beard altruism' [92]. Not many people carry the phenotypic trait of 'green-beard altruism', implying its rarity. Metaphorically parallel to red hair in the human population, the 'green-beard altruist' is a *rare example* of a *rare phenotypic trait* [93]. Yet humans are hypervigilant for those who are similar to themselves. Individuals of different cultures, speaking different languages and practicing different mores can be found around the world; when they are scattered to different parts of the world and meet, they seek those who share the same language and traditions resulting in ghettos, clubs and community schools in the host countries. Not coming from the same family or kin in general does not present an obstacle for them to interrelate, form friendships, or to care for each other [94]. This kind of behaviour explains the beginnings of cooperative and altruistic attitudes where group-selective attitudes enable them to consider benevolence and care-taking toward members of their own tradition rather than members of different traditions [95, 96]. One explanation is that kin-related altruism can be signalled via cultural phenomena [97] as well as relatedness associated with language and shared traditions; these may be more powerful compared to a genetic cause [98, 99].

Thus, group selection's equivalence to kin selection is based on phenotypic similarities of traits observed in both kin and non-kin individuals. Group-selective behaviours of an altruistic kind, such as charity work and empathic understanding, represent wellbeing efforts towards those unable to care for themselves [100]. Kin-selective behaviours can be expressed similarly, though differentiated in intensity; for example, parents will care for sick offspring more than offspring of another family. Nevertheless, such behaviours may be observed with the same intensity toward adopted offspring as well [101-103]. As a result, kin-selective behaviours can be group-selective in nature [19]. Once families care for both their own children and adopted children, altruistic behaviours are elicited by the recipients' need to be cared for [104]. Altruism traits do not solely explain why actors bestow favours on recipients; instead, signals that elicit sympathy and empathy encourage such favours to be bestowed upon the weak and needy who solicit help from salient others, whether or not they are genetically-related family members [105].

From these examples and others, it appears that kin selection may be incorporated into group selection theory. In both group and kin selection, helping behaviours are selected so that cooperation and altruism are bestowed upon even unrelated individuals. Altruism is the key component for these two and suggests that kin selection could be incorporated into group selection [106]. I would argue that group selection is the framework where kin selection is utilized so that altruistic attitudes spread through the group. Group selection favours the evolution of individuals within each specific group [Harvard Medical School, *Dawn of social networks: Ancestors may have formed ties with both kin and non-kin based on shared attributes*, 2012, 27, retrieved on 16

February 2012 from http://www.sciencedaily.com/releases/2012/01/120125132610.htm]. Irrespective of gene-similarity between unrelated individuals, it is phenotypic traits that are selected to advance the lives of individuals whether under conditions of altruism and cooperation or conditions of conflict, competitiveness and aggression [41]. Altruism, though it is regarded by some as a 'selfish' behaviour *manifested through genetic relatedness toward the same kin*, cannot actually be explained this way in group selection since it concerns goodwill directed from actors to totally unrelated recipients [107-110]. Altruistic behaviour is important within the group to maintain cohesiveness and reproductive success; it can prevail as a group-selective attitude to actually outcompete other groups who do not practice within-group altruism [111]. Social groups consist of families whether of close or distant kin. In those families, kin altruism is selected to benefit their members. Kin altruism, as an advantageous behaviour, is embraced by group selection to favour the needs of individuals not necessarily belonging to genetically-related families or kin [112, 87]. In such an understanding, kin selection may still be maintained within the group since, on the one hand, it satisfies the needs of specific kin and, on the other. it is accepted as a valid aspect of behaviour toward members of the group even if unrelated to that family or even toward members of an out-group; here, it takes the form of ascetic altruism [113]. By 'ascetic altruism' are meant altruistic acts bestowed on individuals without any genetic relationship. Such altruism takes place mainly by individuals without progeny but who wish to confer favours on individuals of different kin. A classic example of this is found in monastic communities. Thus, altruistic acts become a social imperative in which every member of society is favoured and benefits [114].

8. Conclusions

In Part I of the article, I have examined inclusive fitness and kin selection theory under the prism of Evolutionary biology and Psychology. Inclusive fitness is understood by some as an expansion to kin selection theory via gene transmission to explain altruism and cooperation. Kin selection claims that individuals are likely to bestow favours on members of their kin compared to non-kin. Inclusive fitness is the reason, according to evolutionary biology, for such genetically-demonstrated altruistic behaviour to spread within a localized cooperating group. Altruistic behaviours can be found in both human and non-human animals. Evidence from nature proves that humans and non-humans care most for their offspring than for the offspring of others. The explanation lies with the fact that such altruistic acts take place so that progeny of parents or relatives may successfully reproduce and pass on those genes to future generations.

Hamilton's rule presents the above in terms of a formula whereby genetic relatedness is positively associated with the willingness of actors to preferentially offer favours to kin so that genes for altruism persist in future generations. The fact, that such altruistic acts may be costly to actors is at the

centre of Hamilton's rule, for it explains why kin selection via inclusive fitness is all about the passing on of genes to future generations. In evolutionary psychology, kin selection and inclusive fitness theories are generally regarded similarly. Altruistic and cooperative acts are explained in evolutionary psychology as issues of adaptation that had to take place in order that not only kin, but also non-kin, would survive as well. That means that altruistic acts play an important role among kin and non-kin and can be bestowed irrespective of whether recipients are genetically-related to their donors or not.

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