

Article

Psychological aspects of human cloning and genetic manipulation: the identity and uniqueness of human beings



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Abstract

Human cloning has become one of the most controversial debates about reproduction in Western civilization. Human cloning represents asexual reproduction, but the critics of human cloning argue that the result of cloning is not a new individual who is genetically unique. There is also awareness in the scientific community, including the medical community, that human cloning and the creation of clones are inevitable. Psychology and other social sciences, together with the natural sciences, will need to find ways to help the healthcare system, to be prepared to face the new challenges introduced by the techniques of human cloning. One of those challenges is to help the healthcare system to find specific standards of behaviour that could be used to help potential parents to interact properly with cloned babies or children created through genetic manipulation. In this paper, the concepts of personality, identity and uniqueness are discussed in relationship to the contribution of twin studies in these areas. The author argues that an individual created by human cloning techniques or any other type of genetic manipulation will not show the donor's characteristics to the extent of compromising uniqueness. Therefore, claims to such an effect are needlessly alarmist.

Keywords: *cloned babies, genetic manipulation, human cloning, non-shared environment, psychological aspects, twin studies*

Introduction

Human cloning has become one of the most controversial issues in contemporary society. Human cloning represents asexual reproduction, but many assume that the result of cloning is not a new individual who is genetically unique. This has given rise to the condemnation of human cloning and some fear for the new developments of the science (Dyens, 2002/2003; Porter-O'Grady, 2003). According to Pence (1998a), this has also led to condemnations of human cloning from the politician's side and to fear, ignorance and 'clonophobia' from the public's side. In addition, Pence also believes that doctors, bioethicists and scientists have done little to help reduce misconceptions and fears of the public.

The critics of human cloning argue that cloning can create serious psychological problems for cloned children. The concerns are related to identity formation, identification, gender identity, individuality, lack of originality and other problems associated with social emotional and cognitive development (Kass, 1997; Annas, 1998; Kass and Wilson, 1998; Pence, 1998b; Wills, 1998; Baird, 1999; Burley and Harris, 1999; Williamson, 1999; Andrews, 2000; Fung, 2000; McGee, 2000a,b; Gonnella and Hojat, 2001; Satava, 2002; The President's Council on Bioethics, 2002; Tannert, 2006). In addition, the opponents of human cloning have also argued that human beings who have been cloned may not have the necessary traits for true independence from their progenitors. McGee (2001), for example, expressed

doubts that a person who has been cloned can feel that her progenitor, who genetically would be her monozygotic twin, may become an appropriate parent.

In this paper, the author argues that any individual created through the application of human cloning techniques or other similar techniques or any other type of genetic manipulation will not show the donor's characteristics to the extent of compromising uniqueness. Therefore, claims to such an effect are needlessly alarmist. Moreover, the experiences of a human clone, as well as the experiences of any human being, independently of the method or technique used for asexual reproduction, will be unique and impossible to replicate. The creation of any genetically identical individual will never lead to the replication of the donor's experiences, because genetically identical individuals are not able to have identical experiences. Human experiences are not independent of space and time and, since every human clone will be born in a unique context, cloned human beings' experiences will be unique. Therefore, cloned individuals, as in the case of any human being, will be able to develop their own identity, their own personality and the uniqueness of being a human being.

On uniqueness and human cloning

The opponents of cloning have stated that cloning of humans is questionable due to the possible psychological problems that cloned persons may experience, such as lack of a sense of uniqueness and problems related to identity development (Annas, 1998; Kass and Wilson, 1998; Wills, 1998; Baird, 1999; Williamson, 1999; Fung, 2000; McGee, 2000b; Tannert, 2006). However, many have refuted the accuracy of these statements, claiming that it is not known if cloned humans will have psychological problems (Madigan, 1998; Evers, 1999). In this controversy, some of the opponents of human cloning claim that those individuals born or produced through nuclear transfer will have to confront themselves with the problem of knowing that they have been planned to be a copy from another person, and this, states Baird, may diminish their sense of uniqueness (Robertson, 1998a; Baird, 1999).

Baird (1999) also outlined some possible psychological problems and social harm issues associated with human cloning: (i) in individuals originating from transfer of an adult's nucleus, the knowledge that one is the result of cloning may diminish one's sense of uniqueness; (ii) individuals originating from embryo splitting carried in the same pregnancy, such as twins or triplets, may have problems in defining expectations of themselves and for their future, because they know there is another genetically identical individual; and (iii) individuals originating from embryo splitting, which are frozen and implanted at another time or in another woman if donated, may have to deal with the knowledge that they have not originated from an undirected combination of two particular genomes (i.e. someone has determined who they are genetically).

Furthermore, the critics of human cloning argue that cloned children may not have the sense of coming from a maternal and paternal line, with attributes coming from both parents, and may not feel that they are unique individuals. Based on that assumption, the first person born through nuclear transfer cloning would have to deal not only with being a

genetic copy of another person, but with the fact of being a person who does not come from the joining of an egg cell and a spermatozoon.

An opposing view to the critics of human cloning is presented by Madigan (1998), who stated that a person who has been cloned will not be a simple replica of another human being but a unique person. According to Madigan, a human clone is an identical twin delayed in time, i.e. a much younger identical twin, reared in a different environment, at a completely different time and with the benefits of not being treated in the same way. The basic fear of cloning is in regards to the nature of a newly created person and that human cloning will be the creation of an identical copy of a particular person. However, this does not have to be so.

Although human clones may have the same nuclear genes as in the case with monozygotic or identical twins, there is no evidence or reason to believe they will not be unique individuals who will have their own personalities and their own philosophy of life (Madigan, 1998; Pence, 1998b; Shannon, 1998; Wills, 1998; Evers, 1999; McConville, 2001; Strong, 2005a). Taken into consideration the extensive amount of research on twin studies, especially on monozygotic twins, there is evidence that supports the idea that personality differences, identity development and the uniqueness of human clones, created through somatic cell nuclear transfer or by any type of genetic manipulation, will be shaped by the interaction between genetic and environmental factors.

On uniqueness and studies of twins

Several authors (Elliott, 1998; Jamieson, 1998; Resnik, 2001) consider that people with the same genes like monozygotic twins are not the same people. Cloned human beings will have physiological differences, as well as different behavioural traits, which led Shermer (1999) to question why moralists are not crying out for legislation against twinning, when nature can already do the cloning: the result is called identical twins. In addition, some authors such as Pence (1998b) indicate that a cloned person would not be an exact copy of an adult human being. Although the gene structure would be very similar at the molecular level, there will be many differences. Moreover, Pence (1998b) and Strong (2005b) point out that the brain cannot be cloned or duplicated and, most importantly, the experiences of a human being cannot be replicated by cloning. Many of these wrong ideas, such as the duplication of the mind, are captured from pure science fiction, poorly informed politicians and irresponsible journalism.

In the field of psychology, we have no evidence that it is possible to replicate in exact detail individual human experience. Many studies on monozygotic twins indicate that, even when they share a high correlation in terms of intelligence and personality features, these values are not equal and these twins are different in terms of individual experiences (Bouchard, 1997). The individual experiences of identical twins are always different, even when they have been reared together with the same mother, the same father and the same environment, and there is no evidence in the field of psychology that these experiences can be replicated.

Kinship research that compares identical twins with fraternal twins in regards to the contribution of heredity and environment on complex human characteristics, such as intelligence and personality development, show no significant results that could be used to support the idea that these complex human characteristics would be exactly replicated when using genetic manipulation to create human clones. For example, research based on kinship studies supports a moderate influence of heredity. Twin studies show that the correlations between the scores of monozygotic twins are higher than the scores of fraternal twins in terms of intelligence, personality characteristics, mental disorders and disorders usually first diagnosed in infancy, childhood or adolescence (Kato and Pedersen, 2005; Baker *et al.*, 2007; Button *et al.*, 2007; Eley *et al.*, 2007; Ge *et al.*, 2007; Hicks *et al.*, 2007; Kas *et al.*, 2007; Kovas and Plomin, 2007; Polderman *et al.*, 2007; Scarr, 1997; Van Hulle *et al.*, 2007; Wade *et al.*, 2007; Brent and Melhem, 2008). However, even when the studies show that the correlations between the scores of monozygotic twins are high, the studies also show that the scores are not identical correlations and that gene–environment interactions and non-shared environmental influences are important to explain these differences.

On identity and human cloning

Baird (1999) views that human cloning presents a threat to our concepts of human identity and individuality. Baird argues that when a child of a particular genetic constitution is deliberately made it is easier to consider the child as a product rather than a gift of providence. Kass (1997) also writes about some of the psychological consequences that a cloned human may experience in her/his life in society. Kass states that cloning will create serious issues of identity and individuality. According to Kass, a person who has been cloned may experience serious concerns about her or his identity, not only because of identical appearance to another human being, but because her identical twin might be her father or mother. In addition to that, Kass points out that people in society will be prone to compare the performances of a cloned person with the performances of her alter ego.

According to Caplan (2002/2003), the arguments against cloning endorsed by Kass and other critics of human cloning are presented as if they certainly possess the moral high ground in the public debate. In addition, Caplan argues that the arguments of Kass and others, are mostly based on pseudoscience, ideology and plain fearmongering, which are used to manipulate public opinion. Evers (1999) also joined the group of opposing views to the critics of human cloning, maintaining that the concept of identity is ambiguous and that the statement that cloning produces identical individuals is not meaningful unless the concept of the notion is clarified.

Identity is defined in psychology as an organized conception of the self, in which the person can define his or her own values, goals and beliefs that an individual wants to include and follow in life. It is also defined as a clearly expressed theory of oneself, as someone who can act on the basis of reason, can explain their own behaviour and actions and can take responsibility for these actions as well (Moshman, 1999). Identity is reached through a series of stages in life (Marcia, 1966, 1980) and each stage is experienced differently by each individual during development and throughout the entire lifespan (Erikson, 1950, 1968).

Identity is the result of a continuous enriching process, in which our entire personality has acquired those individual characteristics that differentiate us from others. The idea that creating another human being with exactly the same genotype would mean creating another human being with the same identity, and the same personality, is fundamentally wrong. At this point, the latter is impossible for us human mortals. Furthermore, in the hypothetical case that scientists one day could create multiple human beings with exactly the same DNA, the creation of these genetically identical individuals would not lead to the production of individuals with the same identity and the same personality. The creation or production of human beings with the same personality and without uniqueness will not be possible, at least on the basis of evidence from research on human beings with identical or nearly identical DNA thus far.

If we would like to speculate with the possibility that, through genetic manipulation, two or more human beings were able to have their brain cloned or duplicated, the duplication of the brains could never give rise to the possibility of developing identical personalities. This would happen because two or more persons who have identical brains would never be able to have the same experiences, since the experiences are always related to time and space and two or more human beings with the same brains could never have the same experience at the same time and in the same space. When I am referring to space, I am referring to what we call in psychology the environment. However, in order to be more specific, when I am referring to space, I am also referring to the three-dimensional region in which matter exist. Although, when space and time may not be the ideal parts of this world on which we can build up certainty and objectivity, space and time are necessary parts of a framework within which we organize our experiences. Moreover, when we mention the environment, we also need to include the participation of the human sensory system. If two or more brains are identical, from a sensorial point of view, we could conclude that both brains have the capacity to process sensorial stimuli equally. However, this would not be possible, since identical sensory systems in human clones would never be able to process the sensory stimuli from the same space and at the same time. In other words, the experiences of human clones in regards to the environmental stimuli will be always individual and unique.

Furthermore, monozygotic twins are not born exactly at the same time and under the same circumstances; neither will human clones be created under the same environmental conditions. These differences are important to understand how environmental influences affect the development of identical twins and also the development of human clones. All these variations in terms of experience and stimulation will generate differences in terms of self-concept, identity development and personality development.

On uniqueness and the method of creation

Fung (2000) stated that one of the major concerns about human cloning is the loss of individuality in the production of genetically identical beings, but said that, if there are no doubts about the spiritual uniqueness and individuality of twins naturally occurring, why one should assume that human

beings who could be cloned will suffer a decline in the sense of individuality. Furthermore, studies show that twins who have identical DNA does not prevent them from possessing individuality and freedom of expression (Robertson, 1998b; De Melo-Martin, 2002). In addition, several studies (Kuhse, 2001; Brock, 2002; Gross, 2003) suggest that human cloning is not a threat to personal identity.

It is well known in the field of psychology that identical twins reared apart have a high correlation in regards to intelligence and personality features. However, none of these studies concluded that identical twins may acquire identical minds, identical personalities or identical levels of intelligence. Therefore, we can conclude that there is no evidence that human beings created through genetic manipulation or genetic recoding will not possess the uniqueness of any other human being. Several twin studies have shown the importance of gene-environment interactions and non-shared environmental influences in explaining personality characteristics, behaviour, identity and individuality issues, general intelligence, behavioural adjustments and mental disorders in dizygotic and monozygotic twins, as well as in unrelated siblings reared together (Button *et al.*, 2007; Eley *et al.*, 2007; Ge *et al.*, 2007; Hicks *et al.*, 2007; Kas *et al.*, 2007; Brent and Melhem, 2008).

Evolutionary psychologist and behavioural geneticist Nancy Segal (1993, 1999, 2000, 2006) points out that the discussion of behavioural aspects of intergenerational cloning would benefit from the reference to the rich psychological literature of twin studies and from diverse theoretical and methodological analyses that researchers have produced of the unique social features of monozygotic twins and experiential differences between monozygotic and dizygotic twins. In a study on genetic and environmental influences underlying general intellectual development of virtual twins, Segal *et al.* (2007) found decreasing influences of shared environmental factors and an increased influence of genetic and non-shared environmental factors on general mental skills during development. The research included 43 virtual twin pairs between the ages of 8 and 13 years. According to Segal *et al.* (2007), virtual twins are siblings who are not biologically related; however, they make the equivalent of twinship. These twins are of the same age and they have been reared together from infancy.

The study of Segal *et al.* (2007) shows that the influence of genetic and non-shared environmental factors on intelligence and on general intellectual skill development increase over time, while the influence of shared environmental factors decreases throughout childhood. The study underscores the influence of non-shared factors on mental development and also underlines the importance of non-shared factors on the general development of unrelated siblings, fraternal twins and monozygotic twins. In addition, it serves as a point of reference in order to predict the influence of the interaction between environmental and genetic factors on social, physical and cognitive development of cloned human beings. The study is relevant since non-shared factors will also contribute to explain identity and personality development, as well as the individuality and the uniqueness of cloned human beings.

In a study designed to examine the children's perceptions of the school environment as related to academic achievement, Walker and Plomin (2006) found a moderate genetic influence on the

perception of the children with respect to the environment of the classroom. The study included 3020 pairs of identical and fraternal twins aged 9 years. Data were collected on their perception in six domains: social integration, opportunity, adventure, general satisfaction, negative affect and teachers. The study found a limited genetic influence on the perception of the children with respect to the environment in the classroom, which was an average of 0.33, 0.06, 0.25, 0.27, 0.19 and 0.20 of the variance, respectively. However, non-shared environmental influences accounted for an average of 0.58, 0.78, 0.64, 0.60, 0.69, and 0.65 of the variance, respectively.

According to Walker and Plomin (2006), the results imply that the perceptions of the environment in the classroom are influenced by the specific individual experiences of the children. Another finding is that shared environmental influences had no significant impact on the perceptions of the children with respect to the environment in the classroom, even when the twins were living in the same family, attending the same schools and learning in the same classroom. According to Walker and Plomin (2006), these findings suggest that children's experiences of the primary school classroom environment are partially mediated by genetics. Moreover, the findings also show that there is an important contribution of non-shared environmental experiences that indicates that, in spite of genetic similarities, an individual experience of a child in the classroom is 'an individual experience'.

Furthermore, these results also suggest that it is impossible to predict the behaviour of cloned children and that, although children's experiences to a large extent are governed by genetics, it is also impossible to predict the behaviour of cloned human infants, based on the numerous studies on monozygotic twins. Most of these studies have shown that there is an important contribution of environmental experiences that explain the behaviour of twins, especially with regard to the influence of individual experiences and interpretations of the environment, suggesting that, even though many people can share an identical genetic structure, these human beings can indeed develop a unique identity and personality.

Greater dangers to human uniqueness

Powerful interests within society and political systems, certain ideologies, forms of government and systems of power that use effective mechanisms of persuasion to manipulate the beliefs and attitudes of the individuals in their concrete life, are the real threats to the independence of thought of the people in a society (Chomsky, 2002). Science, biotechnology and human cloning are not threats to individuality and the uniqueness of a human being. The real threat comes from institutions of subjugation, new technologies of the exercise of power and the highly complex systems of manipulation and conditioning and is embedded in the subjectivity of the persuasive messages of power structures (Foucault, 2000).

It is not through human cloning that those attitudes, beliefs and behaviours are replicated in society and develop a 'cloned mind'. The cloned mind has always existed as the product of oppressive institutions that restrict uniqueness and individuality in order to maintain power and control. Paradoxically the

representatives of power structures in society are the ones that limit new discoveries and technologies, since new discoveries in science and revolutionary technologies often create new paradigms in science or paradigm shifts (Kuhn, 1996) that are usually a challenge to the traditional institutions, the elite culture and the propaganda model that indoctrinate and control society and support these power structures.

Moreover, the individuality and uniqueness of the person is also affected in societies where the system expects that people have to sacrifice individual needs and own expectations to satisfy the expectations of institutions or governments. However, even when the individuality and uniqueness of a human being within these societies is threatened, the similarities do not make these human beings identical either, since genetic and environmental factors interact and influence different areas of human development. This gene–environment interaction creates those differences between human beings that are the basis for individuality and uniqueness.

Personality, identity and uniqueness as a result of gene–environment interactions

According to McConville (2001), the expectations of the parents, the constant comparisons and the narcissistic motivations could psychologically affect the cloned child, and this situation could result in a child suffering constantly oppressive expectations and psychological damage. The actions by these parents could undermine the autonomy of the children as well as the children's privacy, affecting their sense of dignity and self-worth. However, Shermer (1999) points out that behaviour geneticists and evolutionary psychologists in their research show very specifically how environment and heredity interact to shape personality and behaviour. According to Shermer (1999, p. 58).

'This interactionism starts when genes code for biochemical reactions, which regulate physiological changes, which govern biological systems, which impact neurological actions, which induce psychological states, which cause behaviours; these behaviours, in turn, interact with the environment, which change the behaviours, which influence psychological states, which alter neurological actions, which transform biological systems, which modify physiological changes, which transfigure biochemical reactions. And all of this happens in a complex interactive feedback loop between genes and environment throughout development and into adulthood.'

Behavioural geneticists have pointed out that non-shared factors are important in personality development and a child's uniqueness (Braungart *et al.*, 1992a; Emde, 1992; Plomin, 1994; Crawford *et al.*, 2007; Vink *et al.*, 2007; Hansson *et al.*, 2008). As an example, in a study of identical twins (3-year-old monozygotic), the mothers treated each identical twin differently and the differential treatment by the mothers produced some effects in the twins in terms of psychological adjustment, mood and pro-social behaviour (Deater-Deckard *et al.*, 2001).

Heritability estimates and concordance rates used by behavioural geneticists and obtained from kinship studies of intelligence,

mental disorders and personality traits are often used to compare identical twins with fraternal twins. These studies support a moderate role for heredity (Braungart *et al.*, 1992a,b; Loehlin, 1992; Subbarao *et al.*, 2008). Although heritability estimates averaging around 0.50 and high concordance rates show the important role of genetic factors for complex human characteristics in identical twins, kinship studies point out that environment also plays a very important role (Rothbart and Bates, 1998; Saudino, 2005; Brent and Melhem, 2008).

Environmental influences have major effects on the psychological aspects of human individual. Even when genetic factors may account for approximately half of the variance in different aspects of personality, intelligence and other developmental characteristics, this implies that environmental factors account for the other half. Therefore, to claim that a cloned human being is less unique than a non-cloned human being erroneously dismisses the distinctive and dynamic interactions between the human mind and its environment (Hines, 1999).

The environment can be defined as the influence of any external circumstances or conditions that affect physical, social and cognitive development, such as the culture, the parents, the neighbourhood, the type of social organizations and/or social institutions that shape the experiences of human beings. These external circumstances or conditions can also exert influence on education, family, religion, governments, economic systems and the social interactions that baby, adolescent or adult human clones will have with the different groups and individuals in the society. In addition, non-genetic biological factors such as nutrition, exposure to disease and maternal factors while in the uterus are also environmental factors that will influence overall development of any individual as well as the development of genetically identical twins and/or human clones.

In later development, a clone's sense of style and preference would be influenced by environmental factors, as occurs with natural twins (Fung, 2000; Green, 2000). Furthermore, it is important to point out that several twin studies underscore the gene–environment interaction as an important factor that influences physical development, social and cognitive development, as well as many other specific behavioural tendencies and mental disorders of human beings (Tsuang *et al.*, 2004; Saudino, 2005; Narusyte *et al.*, 2006; Tuvblad *et al.*, 2006; D'Onofrio *et al.*, 2007; Brent and Melhem, 2008; Simberg *et al.*, 2009). Moreover, gene–environment interactions can also be considered to explain identity development, personality and the uniqueness of human beings created through genetic manipulation or genetic reprogramming.

In a recent study on common genetic and environmental influences on conduct disorders and major depressive disorders in adolescents, Subbarao *et al.* (2008) shows moderate genetic and shared environmental and substantial non-shared environmental influences on major depressive disorders. The study also shows moderate genetic and non-shared environmental influences and little or no shared environmental influences on conduct disorders. The study was based on a sample of 570 monozygotic twin pairs, 592 dizygotic twin pairs and 426 non-twin siblings aged 12–18 years who were recruited through the Colorado Twin Registry. In addition, the study found that there was a significant correlation between the non-shared environmental influences on lifetime conduct disorders and lifetime major

depressive disorders. Furthermore, the study also found that there was no evidence of a significant correlation between shared environmental influences on major depressive disorders and conduct disorders. In this study, the researchers consider that the data demonstrate the importance of non-shared environment in the aetiology of disorders diagnosed in adolescence. This study on adolescent psychopathology is valuable, as well as many other studies on adult psychopathology and disorders diagnosed in infancy, childhood and adolescence, because of their focus on the significance of non-shared environment in each of the three areas of developmental psychology, namely cognitive, physical and social development. These three areas will also be relevant in relationship to the psychological aspects of human cloning.

Identity, individuality, personality development and all the characteristics that would make a person unique are the result of the interaction between genetics and the environment. The uniqueness of every human is being shaped from the first moment the brain of a particular person is being stimulated by the environment through our senses. That would also be the case for human beings created through genetic manipulation. In the case with monozygotic twins or cloned human babies, even small differences at the time of birth between them can lead to differences of handling and treatment by their primary caregivers, which in turn will lead to differences in the ways that the twins or clones will experience the contact. This initial contact, which is part of the attachment process, is important, especially in reference to the manner in which monozygotic twins and/or baby clones will adjust at home and will interact with their parents and/or family environment in their first moments of life.

Psychology and other social sciences, together with the natural sciences, will need to find ways to co-operate with each other in order to help the healthcare system to be prepared to face the new challenges introduced by the techniques of human cloning. One of those challenges is to help the healthcare system to find specific standards of behaviour that could be used to help potential parents of cloned human beings and/or primary caregivers to interact properly with cloned babies or children created through genetic manipulation. Scholars of various disciplines should then co-operate and find together those standards of behaviour that should also be the focus of attention in any further studies related to identity and personality development of human beings created through genetic manipulation. The basis of these standards of behaviour should not be so different from the standards which have been proven to work best so far for human beings that have not been created through genetic manipulation. The mind of a human being is not only the result of genetic programming but the result of the interaction between genetic and environmental forces. In other words, a person who has been cloned will be a unique individual with her or his own personality.

Conclusion

Human cloning and stem cell research have fuelled much professional and academic debate, strong reactions and controversy in society. At the beginning of the new millennium, the cloning debate has also been reinforced with ethical, religious, scientific and political aspects from the moment that

human cloning has become a real possibility (Madigan, 1998; Wills, 1998; Shannon, 1998; Baird, 1999; Fiddler *et al.*, 1999; Shapiro, 1999; Fung, 2000; Vastag, 2001). These technological advances are also changing attitudes of human beings with respect to the notion of time, space, lifespan, longevity and spirituality, the meaning of life, suffering, the concept of death and the concept of creation.

As Dwyer (1999) points out, 21st century biotechnology will present challenging ethical dilemmas. Many reproductive methods, such as artificial insemination, IVF, freezing of human embryos and surrogate motherhood, were widely condemned in Western society in the past. However, they are now seen not only as a problem that is ethically and morally acceptable, but also beneficial, since each of these methods may enable infertile couples to have children.

McCarthy (1999) looked at various ideas connected with autonomy and concluded that there is no basis to the claim that clones would have much worse lives than non-clones and, therefore, rejects the claim that cloning human beings is morally wrong. In addition, Simpson (2007) and Strong (2005b) indicate that human reproductive cloning could be ethically justifiable in certain cases, provided that the advances in the technology would be able to reduce the risks for physical harm. Furthermore, Simpson and Edwards (2003) point out that recent studies show that public opinion, even when still opposing human reproductive cloning, is gradually becoming more favourable to human cloning technology than the position adopted by certain groups of the scientific community in the field.

There is awareness in the scientific community, including the medical community, that human cloning and the creation of clones are inevitable (Obermann, 1999; Murray, 2002; Van Steenberg, 2002; Khan, 2003). There is also a belief that the medical community will one day have to address the care of and respect for people created by cloning techniques and that the discussion on issues related to human cloning must begin now, before the first person born in this manner becomes fact (Bonnicksen, 1998).

The critics of human cloning often argue that cloning can cause serious psychological problems to cloned children. The concerns are related to identity formation, identification, gender identity, individuality, the lack of uniqueness and other issues related to developmental psychology. This paper has considered that, in the field of psychology, there is no evidence that human beings produced through somatic cell nuclear transfer, or any other type of genetic manipulation, could display the characteristics of their donors to the extent of compromising uniqueness. Therefore, any claims that the outcome will be human beings, who lack uniqueness, are needlessly alarmist.

In the field of psychology, we have no evidence that it is possible to replicate in exact detail every step of individual human experience. Studies on monozygotic twins indicate that identical twins who were separated at birth and reared apart share a high correlation in terms of intelligence and personality features (Bouchard, 1997). However, these values are not equal and these twins are different in terms of individual experiences, even when they have been reared together in the same environment. The individual experiences of identical twins of

a particular environment are always different and there is no evidence in the field of psychology that these experiences can be replicated at all.

The life experiences of a human being who has been cloned, as well as the experiences of any human being, independently of the method or technique used for asexual reproduction, will be unique. Those experiences are not possible to replicate because individuals who are genetically identical are not able to have identical experiences. Human experiences are not independent of space and time and, since every cloned human being is born in a unique context, the life experiences of any cloned person will be individual and unique. Therefore, a cloned individual, as in the case of any human being, will be able to acquire unique experiences that will enable her to develop her own identity and personality and her own uniqueness of being a human being.

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