



HAL
open science

Consumer Neoteny: An Evolutionary Perspective on Childlike Behavior in Consumer Society

Mathieu Alemany Oliver

► **To cite this version:**

Mathieu Alemany Oliver. Consumer Neoteny: An Evolutionary Perspective on Childlike Behavior in Consumer Society. *Evolutionary Psychology: an International Journal of Evolutionary Approaches to Psychology and Behavior*, 2016, 10.1177/1474704916661825 . hal-01466840

HAL Id: hal-01466840

<https://amu.hal.science/hal-01466840>

Submitted on 13 Feb 2017

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution - NonCommercial 4.0 International License

Consumer Neoteny: An Evolutionary Perspective on Childlike Behavior in Consumer Society

Mathieu Alemany Oliver¹

Abstract

This research explores childlike consumer behavior from an evolutionary perspective. More specifically, it uses the concept of neoteny to show that the retention of ancestors' juvenile characteristics is related to specific behaviors. The results of factor analyses conducted on a UK sample ($n = 499$) and a French sample ($n = 292$) 7 years later indicate four dimensions of childlike consumer behavior, namely, stimulus seeking, reality conflict, escapism, and control of aggression.

Keywords

evolutionary psychology, neoteny, paedomorphosis, consumer behavior, childlike behavior

Date received: March 16, 2016; Accepted: June 23, 2016

According to Barber (2007), a childlike feeling of rejuvenation permeates the consumer society, which has entered an infantilist ethos. In search of sensations, adults can take risks and put the reality principle to one side. In the quest for enchantment, they visit theme parks and act “as if.” Fun becomes an imperative (Wolfenstein, 1951): Consumers of all ages play games on their mobile phones while waiting for the bus or show extraordinary excitement about a future purchase. They cook or buy colorful cupcakes or cake lollipops for their guests, perform air guitar at a Dodgers baseball game, and run not only to improve their health but to flee from zombies. Meanwhile, brands such as McDonald's (Australia), Volkswagen (France), Haribo (France), Ford (United States), Mercedes (Hagerstown, MD), Beef 'O' Brady's (United States), San Francisco Giants, Audi (United States), Kia (United States), and Evian (worldwide) are using their commercials to ask their consumers to let out their inner child.

To what extent is this infantilist ethos tied to evolutionary processes? As yet, marketing and communication researchers have not displayed a deep interest in the evolutionary causes of consumer behavior, although there have been a few exceptions (e.g., Griskevicius, Shiota, & Nowlis, 2010; Hantula, 2003; Hudders, De Backer, Fisher, & Vyncke, 2014; Saad, 2007; Saad & Gill, 2000; Vincke, 2016). However, it is possible to provide a clearer understanding of a consumption phenomenon such as childlike behavior by accepting the

assumption that individual variation in behavioral dispositions can be considered from an evolutionary perspective (Buss, 2009; Nettle, 2005).

This article explores the phenomenon of childlike consumer behavior from an evolutionary perspective. In this context, childlike consumer behavior refers to the juvenile characteristics that adult consumers present. It is partly understood as a result of paedomorphosis, which is the retention of ancestors' juvenile characteristics into adulthood. Since Gould (1977), it has been accepted that neoteny, that is a retardation of somatic development, explains most of the paedomorphic aspects in humans.

After sharing the relevant literature on neoteny and the methodology used in this research (scale development through factor analyses), we present and discuss four dimensions of childlike consumer behavior based on evolutionary theories.

¹ CERGAM/AMGSM-IAE Aix, Aix-Marseille Université, Aix-en-Provence cedex 2, France

Corresponding Author:

Mathieu Alemany Oliver, Aix-Marseille Graduate School of Management—IAE Aix, Chemin de la Quille, Puyricard | CS 30063, 13089 Aix-en-Provence cedex 2, France.

Email: mathieu.alemany@iae-aix.com



Neoteny

Biological Neoteny Induces Behavioral Neoteny

Neoteny (literally “to stretch youth”; Kollmann, 1885) is a “paedomorphosis produced by retardation of somatic development” (Gould, 1977, p. 483). It is a developmental process that occurs more slowly than was the case in the subject’s ancestors and causes the retention of juvenile traits in the descendants’ adulthood. Paedomorphosis is part of a larger phenomenon called heterochrony. Heterochrony is defined as a change in the rate or timing of development, which leads to a modification of size and/or shape but also behavior (McKinney, 1999). For instance, Roth, Nishikawa, Naujoks-Manteuffel, Schmidt, and Wake (1993) show how paedomorphic processes in salamanders have modified the nervous system. The Dutch anatomist Bolk (1926) made the first detailed study of the similarities between the anatomy of the *Homo sapiens* and that of young and unborn great apes. But Bolk’s theory and the racist and sexist overtone of his writings made the concept of neoteny more difficult to accept within the research community. While trying to “rescue Bolk’s data,” Gould (1977, p. 356) underlines a number of paedomorphic—mostly neotenous—features that were critical to human evolution. For example, the neotenous human skull (i.e., with reference to chimpanzees, a retardation in shape and an increase in size and in the duration of growth) contributed to brain plasticity, language, and culture. Another example is found in the shape of the pelvis, which permitted an upright stance and bipedalism.

While the main debate around neoteny concerns its central role in human evolution, it is commonly accepted that neoteny played a decisive role and that some other types of heterochrony were also critical (Bogin, 1988; Bromage, 1987; Eccles, 1979; Løvtrup, 1978; McKinney & McNamara, 1991; Shea, 1989). Today, the evidence of human neoteny tends to be outlined in neurological structures and processes as well as human genetics. For example, the ancestral SRGAP2, a gene that is highly expressed during brain development and controls cortical neuron migration, triggers neoteny by delaying dendritic spine maturation (Charrier et al., 2012). More generally, neoteny plays a functional role in the maturation of the prefrontal cortex and in the acquisition of high cognitive abilities and emotional capacities (Petanjek et al., 2011; Somel et al., 2009).

Following McKinney’s (1999) definition of heterochrony, an accepted corollary of the process of neoteny is that the observed retardation of somatic development results in the retention of juvenile traits of behavior. In other words, biological neoteny induces behavioral neoteny (Bjorklund, 1997; Cairns, Garipey, & Hood, 1990; Gottlieb, 1992). For example, canine animals and longhorn sheep display different behavioral systems corresponding to different juvenile ancestral behaviors caused by biological neoteny (Coppinger et al., 1987; Geist, 1971). Mason (1968) and Cairns (1976) suggest that attachment, with respect to humans, is partly due to neoteny, and Lorenz (1971) underlines the importance of these juvenile characteristics in the maintenance of brain plasticity. Finally,

Cairns (1976) points out that neoteny partly explains both the instability of individual differences and the malleability of behaviors during childhood and more largely in every social mammal’s offspring.

Neoteny and Marketing

In marketing research, the concept of neoteny is rarely used and most often deals with anthropomorphic products. Anthropomorphism can be the attribution of a humanlike mind or of humanlike physical features to nonhumans (Waytz, Cacioppo, & Epley, 2010). Anthropomorphic products can be found in very different product categories and brands: products for the home such as Koziol items or the Honda Asimo domestic robot; cars such as the Volkswagen New Beetle (Aggarwal & McGill, 2007); or perfumes, soap, and beverages using hourglass-shaped bottles (e.g., Jean Paul Gaultier, Ivory, or Coca-Cola, respectively). Anthropomorphism is also found in brand communication with half of Ad Age’s top 10 advertising icons of the 20th century being anthropomorphic characters (Brown, 2010). Brown (2010, p. 219) considers neoteny a commonplace feature for anthropomorphic brand characters and puts forward the tendency for some to “get younger, more cherubic, more cuddly, more childlike, more and more cute with the passing years.”

The promotion of neotenous products and brand characters might be explained by the likeliness that consumers will develop affective responses and positive attitudes toward childlike anthropomorphic characteristics (Hellén & Sääksjärvi, 2013; Miesler, Leder, & Herrmann, 2011). For instance, anthropomorphic car design improves the self-driving car experience by increasing individuals’ trust in the autonomous car’s performance (Waytz, Heafner, & Epley, 2014). Similarly, neotenous characteristics in cars such as round and big “eyes” with a high and smooth forehead can signal that there is no threat (e.g., the Volkswagen New Beetle; Woodside, 2010), just like it tells consumers they can develop a playful relationship with the product.

When it comes to consumer research, no study actually evaluates the role of neoteny in consumer behavior. However, evolutionary studies can give consumer researchers a few pointers. For instance, neoteny is a component of physical attractiveness, especially in women (Cunningham, Roberts, Barbee, Druen, & Wu, 1995; Elia, 2013; Jones et al., 1995). Jones (1996) suggests that a preference for women with light skin and fair hair is due not only to political and cultural dominance but also to a preference for neotenous women who already existed in ancient Rome, along with women using cosmetics to lighten their skins. Her studies reveal that only in a few societies (including in non-Westernized populations) are neotenous traits not attractive. As for waist-to-hip ratio (Singh, 1993), neotenous features such as light and smooth skin, large eyes, a small nose, and full lips are indicators of good health and reproductive potential in mate selection; they also represent desirable qualities highlighted by Western consumer

society, such as youth, vivaciousness, openness, and agreeableness (Berry & McArthur, 1985; Rhodes, 2006). Magazines such as *Glamour* and *Cosmopolitan* were found to showcase such neotenous features (Jones, 1996).

One possible consequence of the preference for neotenous features and the presence of neotenous subjects in media might be consumers' willingness to transform into ultra-neotenous species by imitating the aesthetic standards (e.g., neotenous physical traits) conveyed by the media and to adopt childlike behavior by immersing themselves in discourses of eternal youth. This is visible, for example, in the quest for rejuvenescence through the consumption of clothes, cosmetics, Botox, collagen and plastic surgery, and also in the prevalence of coolness and cuteness in popular culture (Belk, Tian, & Paavola, 2010; Cross, 2004; Granot, Alejandro, & Russell, 2014). As illustrated by the Japanese neotenous character Prince Pickles, the official mascot of the Japan Self-Defense Forces, cuteness is highly visible in Japan society at the moment. Cute characters also penetrated Western popular cultures and are displayed as bipedal mammalian with childlike characteristics: They have a rounded, nonsexual, and infantile shape, and they are adorable, gentle, innocent, delicate, and inexperienced (Jackson, 2009; Yano, 2009). Gould's (1980) *Biological Homage to Mickey Mouse* is another good example of the neotenous process taking place in consumer societies.

Method

This exploratory study aims to introduce the neotenous characteristics of childlike consumer behavior. Below we present the participants, materials, and procedures employed in this research.

Participants

British data were collected in 2007 by the Toluna online panel, an independent survey technology provider, on behalf of an international research consultancy. The authors collected the French data in 2014 through a direct online invitation to fill in the translated questionnaire. Participants were considered as consumers from the moment they answered items¹ related to consumption. In total, 499 British consumers (representative online panel with 267 males, 232 females; mean age = 41.66, $SD = 14.21$) and 292 French consumers (158 males, 134 females; mean age = 40.21, $SD = 13.51$) make up the two respective samples.

Among the British participants, 9.6% are located in Scotland, 2% in Northern Ireland, 5.2% in Wales, and 83.2% in England. With regard to their social grade classification,² 26.8% have higher and intermediate managerial, administrative, professional occupations (i.e., Grades A and B); 26.9% have supervisory, clerical and junior managerial, administrative, professional occupations (i.e., Grade C1); 22.4% have skilled manual occupations (i.e., Grade C2); and 23.9% have semiskilled or unskilled manual occupations, casual occupations, or are unemployed or pensioners (i.e., Grades D and

E). Finally, 42.7% of British participants are married, 36.2% are not engaged in a love relationship, and 60.7% have at least one child.

Among the French participants, 38.7% live in the country's three largest cities. Concerning socioprofessional groups,³ 0.7% of participants are farmers; 8.6% are craft workers, retailers, or business owners; 21.9% are chief executives, managers, or have higher grade intellectual occupations; 16.1% have intermediate occupations; 27.1% are white-collar workers; 10.3% are blue-collar workers; and 15.3% are retired, students, or unemployed. Finally, 70.2% are married or live with a significant other, and 65.4% have at least one child.

Materials and Procedures

Following the widely used Churchill (1979) paradigm and the work of Gerbing and Anderson (1988), a reduced set of 55 items to be used in factor analysis was identified from a set of 109 items. The items are based on neoteny, child cognition, and more generally psychology literature, and they cover the following six neoteny-related characteristics: *play* (P. G. Bateson, 1976; Bekoff, 1972; Bjorklund, 1997; Bjorklund & Pellegrini, 2000; Dansky, 1980; Fagen, 1981; Klinger, 1969; Lorenz, 1971; Pellegrini & Bjorklund, 2004; Pellegrini & Smith, 1998; Piaget, 1945/1999; Vygotsky, 1930/2004, 1931/1991, 1933/1967), *attachment* (Bowlby, 1969/1982; Cairns, 1976; Fraley, Brumbaugh, & Marks, 2005; Fraley & Shaver, 2000; Hazan & Shaver, 1987, 1990; Insel, 2000), *regression* (Fischer, 1987; Lindahl, Heimann, & Ullstadius, 2003; Plooiij & van de Rijt-Plooiij, 1989; van de Rijt-Plooiij & Plooiij, 1992), *egocentrism* (Arnett, 1992; Arnett & Balle-Jensen, 1993; Bjorklund, Gaultney, & Green, 1993; Buss, 1997; Chandler & Greenspan, 1972; Elkind, 1967, 1978; Gnepp, 1983; Greene, Krcmar, Walters, Rubin, & Hale, 2000; Harter & Pike, 1984; Looft, 1972; Piaget, 1927/1997; Rothenberg, 1970; Stipek, 1984), *decision-making* (Furby & Beyth-Marom, 1992; Lewis, 1981; Miller & Byrnes, 1997; Steinberg, 2005), and *aggressiveness* (Crick & Dodge, 1994; Evans & Short, 1991; Keltikangas-Järvinen, 2001; Mize & Cox, 1990; Slaby & Guerra, 1988).

The 2007 questionnaire took an average time of 20 min to complete. The first section of the questionnaire dealt with demographic and socioeconomic questions (e.g., gender, age, social grade, income, place of residence, and chief income earner in the household). The second section displayed the 55 items about consumer neoteny that were retained. Items were measured on 5-point Likert-type scales, 1 being *disagree strongly* and 5 being *agree strongly*. A third section, for the exclusive use of the research consultancy and not used in the present research, dealt with consumption habits and behaviors.

The 2014 questionnaire took an average time of 8 min to complete. The second section of the 2007 questionnaire was translated through the back-translation method as detailed by Brislin (1970) and put online for French consumers. A preliminary section was created for demographic and socioeconomic data. French items were measured with 11-point Likert-type

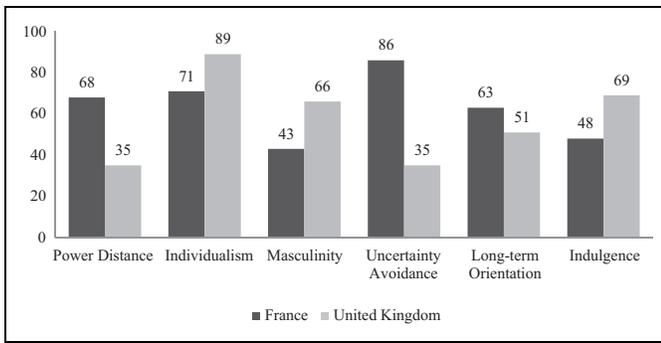


Figure 1. Cultural differences between France and the UK. Adapted from Hofstede, Hofstede, and Minkov (2010).

scales, 1 being *disagree strongly* and 11 being *agree strongly*, and took the form of moving cursors initially placed on scale point 6. The number of points was decided with the aim to get smoother distributions with greater variation (Dawes, 2002). Also, for future research, 11-point Likert-type scales proved to be valid and reliable in cross-cultural studies (Scherpenzeel & Saris, 1997). Participants had a chance to win gift cards if they completed the questionnaire. The university ethics committee approved this research. All respondents were informed of the general aims, their anonymity was guaranteed, and all gave full consent.

Replication procedures for further comparisons of results were adopted. As Asendorpf et al. (2013, p. 108) remind researchers, “the replicability of research findings in psychology [...] has been increasingly questioned.” In the context of this research, replicability is even more critical because the findings deal with evolutionary processes. As a result, they should be compared across several generations to observe changes in childlike consumer behavior. For this reason,⁴ the UK sample was randomly split in half to conduct internal replication analysis consisting of running an exploratory factor analysis (EFA) on each split sample (Osborne & Fitzpatrick, 2012). As a result, we worked on one sample of 249 (125 males, 124 females; mean age = 41.53, $SD = 14.47$) and another sample of 250 (142 males, 108 females; mean age = 41.79, $SD = 13.97$).

External replicability was tested by collecting new data 7 years later in France. The first reason for collecting new data at a different time and place is that cultural differences between the UK and France may have consequences for the four dimensions of childlike consumer behavior and the external replication of the results. As shown in Figure 1, these two countries differ with respect to the six dimensions of national culture (Hofstede, Hofstede, & Minkov, 2010). Moreover, dimensions such as uncertainty avoidance may be related to childlike consumer dimensions such as stimulus seeking. The other reason is that consumers in 2007 (first sample) were not affected by the global financial crisis yet, while 2014 consumers (second sample) have possibly experienced a decline in their savings, as well as job uncertainty, increased risk aversion or lower disposable income. Since it has been shown that consumers change

their behavior after an economic recession (e.g., Kamakura & Du, 2012), it was critical to replicate the analysis and see whether the four dimensions remained stable.

Results

EFA

An EFA using the maximum likelihood method of extraction and oblique rotation (promax) was conducted in the UK’s randomly split sample ($n = 249$; 125 males, 124 females; mean age = 41.53, $SD = 14.47$). The choice of extraction and rotation methods was based on the assumption of dependence between factors.

Four factors and 17 items were retained, and they explain 71% of total variance. The four factors are *escapism*, *reality conflict*, *stimulus seeking*, and *control of aggression*. The number of factors was determined by the Guttman–Kaiser criterion (four factors were suggested), Cattell’s scree test (four factors were suggested), Velicer’s map (four factors were suggested), Horn’s parallel analysis (five factors were suggested), and finally their interpretability.

The correlation matrix did not reveal a multicollinearity issue, the Kaiser–Meyer–Olkin (KMO) measures of sampling adequacy were higher than 0.8 ($KMO = .824$), Bartlett’s test of sphericity was significant, $\chi^2(136) = 2,226.33$; $p < .00$, and the KMO values for each variable (i.e., elements on the diagonal of antiimage correlation matrix) were all greater than .74. Communalities are presented in Table 1. Finally, reliability was measured with Cronbach’s α , Jöreskog’s ρ , and item-to-total correlations. Discriminant validity was assessed with the factor correlation matrix.

Confirmatory Factor Analyses (CFAs)

In order to test the factor structure’s quality of representation, we conducted a first CFA with the second UK split sample ($n = 250$; 142 males, 108 females; mean age = 41.79, $SD = 13.97$). Power estimates show an acceptable sample size for CFA (minimum n required for power $\geq .80 = 165$; Kim, 2005; MacCallum, Browne, & Sugawara, 1996). With four factors and between 3 and 5 items per factor, the sample size is also acceptable according to Wolf, Harrington, Clark, and Miller (2013). Common method bias was controlled using Harman’s single factor test and the latent common methods variance factor (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). The results of Harman’s test indicate that a single factor cannot explain the majority of variance (only 20.5% of variance explained). Additionally, we observed very little change after adding a latent factor in the CFA model and comparing the standardized regression weights from this model with the original model’s standardized regression weights.

The measures reveal a good fit for the four-factor model, $\chi^2(113) = 188.71$, $p < .00$; $\chi^2/df = 1.67$; adjusted goodness-of-fit index (AGFI) = .89; comparative fit index (CFI) = .97; Tucker–Lewis index (TLI) = .96; standardized root mean

Table 1. Four-Factor Structure—Childlike Consumer Behavior Based on Neoteny.

Items	Communalities	Stimulus Seeking	Reality Conflict	Escapism	Control of Aggression
I like to take risks <i>J'aime prendre des risques</i>	.777	.864			
I consider myself a thrill seeker <i>Je suis un(e) amateur(-trice) de sensations fortes</i>	.719	.835			
I strive to fill my life with exciting activities <i>Je fais tout pour remplir ma vie d'activités excitantes</i>	.747	.871			
I like to try new products and consumption experiences <i>J'aime tester de nouveaux produits et vivre de nouvelles expériences de consommation</i>	.601	.774			
Most of the events that happen in my life are out of my control <i>J'ai l'impression de ne pas contrôler ma vie</i>	.600		.758		
I find being an adult quite difficult as one has to concentrate so much <i>Etre adulte est difficile car il faut énormément se concentrer</i>	.636		.784		
I find having responsibilities very stressful <i>Avoir des responsabilités est pour moi très stressant</i>	.607		.736		
There are a lot of things I miss about being a child <i>Beaucoup de choses me manquent à l'idée de ne plus être un(e) enfant</i>	.519		.751		
I often find myself confronted with too many choices <i>J'ai souvent trop de choix à faire</i>	.564		.752		
I prefer reading factual books or watching documentaries to reading or watching fiction <i>Je préfère les livres qui traitent de faits réels ou les documentaires TV plutôt que les livres et programmes TV de fiction</i>	.467			-.696	
I like to lose myself in fictional books and TV programs <i>J'aime me laisser transporter par des livres et/ou des programmes TV de fiction</i>	.577			.776	
I like to daydream <i>J'aime me laisser aller à la rêverie</i>	.635			.775	
I'm never happier than when I'm playing a game <i>Quand je joue à un jeu, je suis le(la) plus heureux(-se)</i>	.517			.676	
I sometimes fantasize about being famous <i>Il m'arrive de m'imaginer être célèbre</i>	.518			.698	
I am quite short-tempered <i>Je m'emporte assez facilement</i>	.778				.889
I sulk sometimes if I don't get my own way <i>Il m'arrive de faire la tête ou de boudier lorsque les choses ne se passent pas comme je l'ai décidé</i>	.674				.808
I sometimes feel quite aggressive toward people <i>Il m'arrive de me trouver agressif(-ve) envers les autres</i>	.711				.843
Eigenvalues		3.34	3.99	3.14	1.61
Percentage of variance		19.67	23.46	18.47	9.447
Cronbach's α		.90	.87	.83	.88
Jöreskog's ρ (composite reliability)		.91	.92	.70	.90
ρ vc (average variance extracted)		.72	.69	.52	.75
Maximum shared variance		.12	.12	.04	.07
Average shared squared variance		.06	.08	.04	.04

square residual (SRMR) = .052; root mean square error of approximation (RMSEA) = .052 (Iacobucci, 2010). Discriminant validity and convergent validity were both accepted (Fornell & Larcker, 1981).

For external replicability matters developed in the previous section, the factor structure's quality of representation was assessed in another context (France) and at a different time (7 years later, in 2014). A second CFA was carried out on the French sample ($n = 292$; 158 males, 134 females; mean age = 40.21, $SD = 13.51$). The measures confirm a good fit for the

four-factor model, $\chi^2(113) = 272.65$, $p < .00$; $\chi^2/df = 2.41$; AGFI = .87; CFI = .95; TLI = .94; SRMR = .060; RMSEA = .07 (Iacobucci, 2010). Discriminant validity and convergent validity were both accepted (Fornell & Larcker, 1981).

Four Dimensions

The 17-item scale developed in this research and presented in Table 1 captures four dimensions of childlike consumer behavior based on neoteny: *stimulus-seeking* (Cronbach's $\alpha = .90$),

reality conflict ($\alpha = .87$), *escapism* ($\alpha = .83$), and *control of aggression* ($\alpha = .88$). The scale is reliable and valid across Western European cultural contexts (United Kingdom and France).

The *stimulus-seeking* dimension involves the tendency to seek stimulation in a variety of ways and to respond to exciting situations in a positive way. It relates to confidence in oneself, life, and people, and it is very close to Mehrabian and Russell's (1974) "need for arousal" dimension. The *reality conflict* dimension captures the struggle that consumers have with the complexities and responsibilities of adult reality. The *escapism* dimension underlines the rich inner life of consumers who may need to retire from reality but also adapt to it. Finally, the *control of aggression* dimension represents consumers' lack of aggressive control due to difficulties in managing events, issues, and (more generally) every situation that involves decision-making skills.

General Discussion

The main objective of this research was to provide a deeper understanding of neoteny in the context of consumer society. We have proposed that paedomorphosis, which is the retention of ancestors' juvenile characteristics into adult consumers, can explain childlike consumer behavior in part. Among paedomorphic processes, we focused on neoteny, which is a retardation of somatic development. Our findings show that stimulus seeking (or the need for arousal), reality conflict, escapism, and control of aggression are four dimensions of consumer behavior that are theoretically partly explained by neoteny. For this reason, these four dimensions represent childlike consumer behavior. To the best of our knowledge, this research is the first empirical work in marketing research to tie paedomorphosis—and more precisely, neoteny—to consumer psychology and childlike behavior.

Limitations

A first limitation is the low but still acceptable reliability of composite score (Jöreskog's $\rho = 0.70$) of the escapism dimension. A possible reason is that the escapism dimension is too broad a spectrum to be grasped in its entirety. For instance, escapism is linked to imagination, but imagination can be related to fantasy, creativity, intellect, or complexity (Hofstee, de Raad, & Goldberg, 1992). It is also highly related to the broad concept of play, which remains one of the most difficult concepts to define (Klinger, 1969; Lieberman, 1977; Sutton-Smith, 1997).

A second limitation concerns our inability to compare these findings across time and with non-Western European places. Because paedomorphosis is the retention of ancestors' juvenile characteristics into adulthood, several studies should be conducted in the future to draw comparisons with the present findings. Moreover, these findings should be compared with populations from non-Western European cultures. Culture can be considered a mediator or moderator variable (Cuéllar, 2000)

that can reveal different items or even different childlike dimensions. For instance, Confucianism and Buddhism still shape Japanese culture and, as a collectivistic society, Japan emphasizes social harmony and interdependence. These cultural characteristics can have consequences on emotion regulation (Matsumoto, 2006) and may impact not only the scores obtained by consumers on the four dimensions of childlike consumer behavior but also the dimensions themselves. For example, decision-making, which is related to the reality conflict and control of aggression dimensions, is also related to emotion regulation (Heilman, Crişan, Houser, Miclea, & Miu, 2010).

A third limitation is the lack of empirical evidence showing the relationship between the present findings and those of Hellén and Sääksjärvi (2013). More particularly, consumer neoteny could explain the positive attitude that neotenous products trigger. For example, needs for attachment and safety during periods of regression could lead to a preference for anthropomorphic and neotenous products and brands. Similarly to brand love, which can create feelings of confidence (Batra, Ahuvia, & Bagozzi, 2012; Fournier, 1998), neotenous brands and products would be able to recreate a safe environment in which adult consumers can live out their unstable life moments and reality conflicts more easily.

Childlike Consumer Behavior and Intelligence

A critical discussion topic relates to the potential role that intelligence—defined in this article as the ability to achieve goals and adapt to different and changing environments (Legg & Hutter, 2007)—might have on the four dimensions of childlike consumer behavior highlighted among the samples. Neotenous processes are partly responsible for the extended development of the human brain that allows individuals to continue learning and accounts for human high intelligence (Gibson, 1991). One reason for such cognitive abilities might be found in the frontal lobe, which benefits from the extended development of the human brain and contributes to intelligence by providing executive functions, for example (Bunge, Dudukovic, Thomason, Vaidya, & Gabrieli, 2002; Duncan, 1995; Duncan, Emslie, Williams, Johnson, & Freer, 1996). The frontal lobe is able to enhance working memory, help individuals to regulate aggression, and allow mental flexibility, abstract thinking, and the capacity to keep related pieces of information in their minds for task analysis (Duncan, 2005; Miyake et al., 2000; Obonsawin et al., 2002).

In the context of this research, the four dimensions of childlike consumer behavior might be related to the frontal lobe and intelligence by reflecting different adaptive and maladaptive behaviors. Our findings reveal that two dimensions, namely, stimulus seeking and escapism, relate directly to play. Play is an adaptive, experiential function (Bateson & Martin, 2013) and a critical element in cognitive development (Bjorklund, 1997) that can partly explain an increase in the amount of synaptic pruning that shapes the neural network (McShea & Hordijk, 2013). Therefore, stimulus seeking and escapism

might be interpreted as motivational processes of personal and creative environment modification that are mainly made possible through play and can be partly explained by intelligence and the extended development of the frontal lobe.

Concerning the reality conflict and control of aggression dimensions, they are both linked to decision-making. Decision-making is related to adaptive behavior (Keith, Fehrmann, Harrison, & Pottebaum, 1987; Payne, Bettman, & Johnson, 1988). Following the somatic marker hypothesis (Damasio, Tranel, & Damasio, 1991), the reality conflict and control of aggression dimensions might be explained by an immature frontal lobe that would produce low capacities in decision-making and qualitatively poor, ineffective and aggressive solutions to a problem (Crick & Dodge, 1994; Evans & Short, 1991; Keltikangas-Järvinen, 2001; Mize & Cox, 1990; Slaby & Guerra, 1988). Therefore, one may say that the reality conflict and control of aggression dimensions would reflect the inability of consumers to engage in a process of personal and creative environment modification partly due to an immature frontal lobe that makes exploration, exploitation, and adjustment more difficult (Cohen, McClure, & Yu, 2007).

In conclusion, findings suggest that childlike consumer behavior might be related to the frontal lobe and intelligence by reflecting different adaptive and maladaptive behaviors. However, the four dimensions seem to use different types of intelligence—mainly a cognitive and an emotional one. While the stimulus-seeking and escapism dimensions would be more related to cognitive intelligence (e.g., stimulus seekers are the creators of an enriched environment that triggers cognitive stimulation; Raine, Reynolds, Venables, & Mednick, 2002), the reality conflict and control of aggression dimensions would reflect poor decision-making skills that can be explained by lower levels of emotional intelligence (Bar-On, Tranel, Denburg, & Bechara, 2003). In this context, further research should investigate how adaptive behaviors in childlike consumption contexts can vary according to the levels of cognitive intelligence and emotional intelligence.

Managerial Implications

Findings should help managers to segment their consumers around the four dimensions of childlike consumer behavior and to develop new positioning strategies. Brands can exploit these four dimensions to communicate with a new language and can adapt their customer relationship management (CRM) programs according to their target market. For instance, if the target market is made up of stimulus seekers, then the relationship between the brand and the consumer should be based on “best friendship” (Fournier, 1998). By contrast, if the target market mainly comprises consumers who score high on the reality conflict dimension, then the relationship should be based on “dependency” (Fournier, 1998).

Another way to exploit the four dimensions of childlike consumer behavior in CRM is by differentiating between scores related to cognitive intelligence and those related to emotional intelligence. While it has not been widely discussed

in marketing, emotional intelligence plays a critical role in the buying process and consumption experience. For instance, salespeople with high emotional intelligence can develop longer relationships with customers and increase sales revenue (Kidwell, Hardesty, Murtha, & Sheng, 2011). From the consumer experience standpoint, we suggest that managers relate the dimensions of their brand personality to the type of intelligence the brand reflects and use the four dimensions of childlike behavior to trigger cognitive or emotional stimulation accordingly.

Finally, it is critical that managers develop playful products and services and differentiate between the types of play. For instance, consumers engage in play whether they score high on escapism or stimulus seeking. However, play used for escapism is an imaginative play that one does not find in the stimulus-seeking dimension. This differentiation is visible, for example, in Las Vegas hotels that offer not only imaginative play but also attractions and contests. The focus on play makes even more sense in advanced industrial societies for two reasons. First, disposable income increases and allows more leisure activities for consumers (Engel’s law). Second, social adulthood is postponed at later ages (Arnett, 2000), while the consumption of sugar, fat, and endocrine disrupting chemicals provoke progenesis (i.e., the retention of juvenile traits through an acceleration of sexual maturation; Aksglaede, Sørensen, Petersen, Skakkebak, & Juul, 2009; Biro et al., 2013; Euling et al., 2008; Louis et al., 2008). These two phenomena might lead consumers to accentuate childlike behavior since they become more juvenile, biologically speaking, while simultaneously living in societies that postpone entry into adulthood. In the leisure sector, increasing playfulness should give rise to new opportunities in specific markets. A good example is the increasing success of film tourism that allows consumers to escape mundane environments and adopt a childlike behavior through regression (Crompton, 1979; Macionis & Sparks, 2009). Utilitarian products should become more and more playful, too, in particular thanks to the digital turn and the Internet of Things that transforms any product into an interactive and ludic object (e.g., smart or connected refrigerator, doors, toothbrush . . .).

Acknowledgments

The author gratefully acknowledges the important contributions of Jonathan Fletcher and the Illuminas Group for sharing their data. The author would also like to thank the two anonymous reviewers for their constructive suggestions; Benjamin Prud’homme for his discussion of paedomorphic processes, and Elyette Roux, Eric Tafani, and Jamel Khenfer for their comments on earlier drafts.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Notes

1. Examples of items included in the questionnaires: “I always buy new technology products quite soon after they are launched as I can see how useful they are to me,” “It is important to me that others like the products and brands that I buy,” “Shopping for clothes is more of an inconvenience than a pleasure,” or “J’aime consommer certains produits, services ou marques pour m’évader du quotidien” (translated, I like to use certain products, services, or brands to escape from everyday life).
2. This classification is used by the National Readership Survey.
3. These groups are used by the Institut National de la Statistique et des Etudes Economiques (INSEE; National Institute of Statistics and Economic Studies).
4. The split-half sample also allowed the authors to specify a confirmatory factor analysis model in the next step that can fit the other half of the data used for exploratory factor analysis (Fabrigar, Wegener, MacCallum, & Strahan, 1999).

References

- Aggarwal, P., & McGill, A. L. (2007). Is that car smiling at me? Schema congruity as a basis for evaluating anthropomorphized products. *Journal of Consumer Research*, *34*, 468–479.
- Aksglaede, L., Sørensen, K., Petersen, J. H., Skakkebaek, N. E., & Juul, A. (2009). Recent decline in age at breast development: The Copenhagen puberty study. *Pediatrics*, *123*, e932–e939.
- Arnett, J. (1992). Reckless behavior in adolescence: A developmental perspective. *Developmental Review*, *12*, 339–373.
- Arnett, J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist*, *55*, 469–480.
- Arnett, J., & Balle-Jensen, L. (1993). Cultural bases of risk behavior: Danish adolescents. *Child Development*, *64*, 1842–1855.
- Asendorpf, J. B., Conner, M., De Fruyt, F., De Houwer, J., Denissen, J. J., Fiedler, K., . . . Perugini, M. (2013). Recommendations for increasing replicability in psychology. *European Journal of Personality*, *27*, 108–119.
- Bar-On, R., Tranel, D., Denburg, N. L., & Bechara, A. (2003). Exploring the neurological substrate of emotional and social intelligence. *Brain*, *126*, 1790–1800.
- Barber, B. R. (2007). *Consumed: How markets corrupt children, infantilize adults, and swallow citizens whole*. New York, NY: Norton.
- Bateson, P. G., & Martin, P. (2013). *Play, playfulness, creativity and innovation*. Cambridge, England: Cambridge University.
- Bateson, P. G. (1976). Rules and reciprocity in behavioural development. In P. G. Bateson & R. A. Hinde (Eds.), *Growing points in ethology* (pp. 401–421). Cambridge, England: Cambridge University.
- Batra, R., Ahuvia, A., & Bagozzi, R. P. (2012). Brand love. *Journal of Marketing*, *76*, 1–16.
- Bekoff, M. (1972). The development of social interaction, play, and metacommunication in mammals: An ethological perspective. *Quarterly Review of Biology*, *47*, 412–434.
- Belk, R. W., Tian, K., & Paavola, H. (2010). Consuming cool: Behind the unemotional mask. *Research in Consumer Behavior*, *12*, 183–208.
- Berry, D. S., & McArthur, L. Z. (1985). Some components and consequences of a babyface. *Journal of Personality and Social Psychology*, *48*, 312–323.
- Biro, F. M., Greenspan, L. C., Galvez, M. P., Pinney, S. M., Teitelbaum, S., Windham, G. C., . . . Kushi, L. H. (2013). Onset of breast development in a longitudinal cohort. *Pediatrics*, *132*, 1019–1027.
- Bjorklund, D. F. (1997). The role of immaturity in human development. *Psychological Bulletin*, *123*, 153–169.
- Bjorklund, D. F., Gaultney, J. F., & Green, B. L. (1993). I watch therefore I can do: The development of metaimitation over the preschool years and the advantage of optimism in one’s imitative skills. In M. L. Howe & R. Pasnak (Eds.), *Emerging themes in cognitive development* (Vol. 2, pp. 79–102). New York, NY: Springer-Verlag.
- Bjorklund, D. F., & Pellegrini, A. D. (2000). Child development and evolutionary psychology. *Child Development*, *71*, 1687–1708.
- Bogin, B. (1988). *Patterns of human growth*. New York, NY: Cambridge University.
- Bolk, L. (1926). *Das Problem der Menschwerdung*. Jena, Germany: Gustav Fischer.
- Bowlby, J. (1969/1982). *Attachment and loss*. New York, NY: Basic Books.
- Brislin, R. W. (1970). Back-translation for cross-cultural research. *Journal of Cross-Cultural Psychology*, *1*, 185–216.
- Bromage, T. G. (1987). The biological and chronological maturation of early hominids. *Journal of Human Evolution*, *16*, 257–272.
- Brown, S. (2010). Where the wild brands are: Some thoughts on anthropomorphic marketing. *The Marketing Review*, *10*, 209–224.
- Bunge, S. A., Dudukovic, N. M., Thomason, M. E., Vaidya, C. J., & Gabrieli, J. D. (2002). Immature frontal lobe contributions to cognitive control in children: Evidence from fMRI. *Neuron*, *33*, 301–311.
- Buss, D. M. (1997). Biological determinants of personality. In R. Hogan, J. Johnson, & S. Briggs (Eds.), *Handbook of personality psychology* (pp. 315–344). San Diego, CA: Academic.
- Buss, D. M. (2009). The great struggles of life: Darwin and the emergence of evolutionary psychology. *American Psychologist*, *64*, 140–148.
- Cairns, R. B. (1976). The ontogeny and phylogeny of social behavior. In M. E. Hahn & E. C. Simmel (Eds.), *Evolution and communicative behavior* (pp. 115–139). New York, NY: Academic Press.
- Cairns, R. B., Garipey, J. L., & Hood, K. E. (1990). Development, microevolution, and social behavior. *Psychological Review*, *97*, 49–65.
- Chandler, M. J., & Greenspan, S. (1972). Ersatz egocentrism: A reply to H. Borke. *Developmental Psychology*, *7*, 104–106.
- Charrier, C., Joshi, K., Coutinho-Budd, J., Kim, J. E., Lambert, N., De Marchena, J., . . . Polleux, F. (2012). Inhibition of SRGAP2 function by its human-specific paralogs induces neoteny during spine maturation. *Cell*, *149*, 923–935.
- Churchill, G. A. (1979). A paradigm for developing better measures of marketing constructs. *Journal of Marketing Research*, *16*, 64–73.
- Cohen, J. D., McClure, S. M., & Yu, A. J. (2007). Should I stay or should I go? How the human brain manages the trade-off between exploitation and exploration. *Philosophical Transactions of the Royal Society of London B: Biological Sciences*, *362*, 933–942.

- Coppinger, R., Glendinning, J., Torop, E., Matthey, C., Sutherland, M., & Smith, C. (1987). Degree of behavioral neoteny differentiates canid polymorphs. *Ethology*, *75*, 89–108.
- Crick, N. R., & Dodge, K. A. (1994). A review and reformulation of social information-processing mechanisms in children's social adjustment. *Psychological Bulletin*, *115*, 74–101.
- Crompton, J. L. (1979). Motivations for pleasure vacation. *Annals of Tourism Research*, *6*, 408–424.
- Cross, G. (2004). *The cute and the cool: Wondrous innocence and modern American children's culture*. Oxford, England: Oxford University.
- Cuéllar, I. (2000). Acculturation as a moderator of personality and psychological assessment. In R. H. Dana (Ed.), *Handbook of cross-cultural and multicultural personality assessment* (pp. 113–129). New York, NY: Psychology Press.
- Cunningham, M. R., Roberts, A. R., Barbee, A. P., Druen, P. B., & Wu, C. H. (1995). Their ideas of beauty are, on the whole, the same as ours: Consistency and variability in the cross-cultural perception of female physical attractiveness. *Journal of Personality and Social Psychology*, *68*, 261–279.
- Damasio, A. R., Tranel, D., & Damasio, H. (1991). Somatic markers and the guidance of behavior: Theory and preliminary testing. In H. S. Levin, H. M. Eisenberg, & A. L. Benton (Eds.), *Frontal lobe function and dysfunction* (pp. 217–229). New York, NY: Oxford University.
- Dansky, J. L. (1980). Make-believe: A mediator of the relationship between play and associative fluency. *Child Development*, *51*, 576–579.
- Dawes, J. (2002). Five point vs. eleven point scales: Does it make a difference to data characteristics. *Australasian Journal of Market Research*, *10*, 1–17.
- Duncan, J. (1995). Attention, intelligence, and the frontal lobes. In M. S. Gazzaniga (Ed.), *The cognitive neurosciences* (pp. 721–733). Cambridge, MA: MIT.
- Duncan, J. (2005). Frontal lobe function and general intelligence: Why it matters. *Cortex*, *41*, 215–217.
- Duncan, J., Emslie, H., Williams, P., Johnson, R., & Freer, C. (1996). Intelligence and the frontal lobe: The organization of goal-directed behavior. *Cognitive Psychology*, *30*, 257–303.
- Eccles, J. C. (1979). *The understanding of the brain*. New York, NY: McGraw-Hall.
- Elia, I. E. (2013). A foxy view of human beauty: Implications of the farm fox experiment for understanding the origins of structural and experiential aspects of facial attractiveness. *The Quarterly Review of Biology*, *88*, 163–183.
- Elkind, D. (1967). Egocentrism in adolescence. *Child Development*, *38*, 1025–1034.
- Elkind, D. (1978). Understanding the young adolescent. *Adolescence*, *13*, 127–134.
- Euling, S. Y., Herman-Giddens, M. E., Lee, P. A., Selevan, S. G., Juul, A., Sørensen, T. I., . . . Swan, S. H. (2008). Examination of US puberty-timing data from 1940 to 1994 for secular trends: Panel findings. *Pediatrics*, *121*, s172–s191.
- Evans, S. W., & Short, E. J. (1991). A qualitative and serial analysis of social problem solving in aggressive boys. *Journal of Abnormal Child Psychology*, *19*, 331–340.
- Fabrigar, L. R., Wegener, D. T., MacCallum, R. C., & Strahan, E. J. (1999). Evaluating the use of exploratory factor analysis in psychological research. *Psychological Methods*, *4*, 272–299.
- Fagen, R. (1981). *Animal play behavior*. New York, NY: Oxford University.
- Fischer, K. W. (1987). Relations between brain and cognitive development. *Child Development*, *58*, 623–632.
- Fournier, S. (1998). Consumers and their brands: Developing relationship theory in consumer research. *Journal of Consumer Research*, *24*, 343–353.
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, *18*, 39–50.
- Fraley, R. C., Brumbaugh, C. C., & Marks, M. J. (2005). The evolution and function of adult attachment: A comparative and phylogenetic analysis. *Journal of Personality and Social Psychology*, *89*, 731–746.
- Fraley, R. C., & Shaver, P. R. (2000). Adult romantic attachment: Theoretical developments, emerging controversies, and unanswered questions. *Review of General Psychology*, *4*, 132–154.
- Furby, L., & Beyth-Marom, R. (1992). Risk taking in adolescence: A decision-making perspective. *Developmental Review*, *12*, 1–44.
- Geist, V. (1971). *Mountain sheep: A study in behavior and evolution*. Chicago, IL: University of Chicago.
- Gerbing, D. W., & Anderson, J. C. (1988). An updated paradigm for scale development incorporating unidimensionality and its assessment. *Journal of Marketing Research*, *25*, 186–192.
- Gibson, K. R. (1991). Myelination and behavioral development: A comparative perspective on questions of neoteny, altriciality and intelligence. In K. R. Gibson & A. C. Petersen (Eds.), *Brain maturation and cognitive development: Comparative and cross-cultural perspectives* (pp. 29–63). Hawthorne, NY: Aldine De Gruyter.
- Gnepp, J. (1983). Children's social sensitivity: Inferring emotions from conflicting cues. *Developmental Psychology*, *19*, 805–814.
- Gottlieb, G. (1992). *Individual development and evolution: The genesis of novel behavior*. New York, NY: Oxford University.
- Gould, S. J. (1977). *Ontogeny and phylogeny*. Cambridge, MA: Harvard University.
- Gould, S. J. (1980). *The Panda's thumb: More reflections in natural history*. New York, NY: Norton & Company.
- Granot, E., Alejandro, T. B., & La Toya, M. R. (2014). A socio-marketing analysis of the concept of cute and its consumer culture implications. *Journal of Consumer Culture*, *14*, 66–87.
- Greene, K., Krmar, M., Walters, L. H., Rubin, D. L., & Hale, L. (2000). Targeting adolescent risk-taking behaviors: The contributions of egocentrism and sensation-seeking. *Journal of Adolescence*, *23*, 439–461.
- Griskevicius, V., Shiota, M. N., & Nowlis, S. M. (2010). The many shades of rose-colored glasses: An evolutionary approach to the influence of different positive emotions. *Journal of Consumer Research*, *37*, 238–250.
- Hantula, D. A. (2003). Guest editorial: Evolutionary psychology and consumption. *Psychology & Marketing*, *20*, 757–763.
- Harter, S., & Pike, R. (1984). The pictorial scale of perceived competence and social acceptance for young children. *Child Development*, *55*, 1969–1982.

- Hazan, C., & Shaver, P. R. (1987). Romantic love conceptualized as an attachment process. *Journal of Personality and Social Psychology*, *52*, 511–524.
- Hazan, C., & Shaver, P. R. (1990). Love and work: An attachment-theoretical perspective. *Journal of Personality and Social Psychology*, *59*, 270–280.
- Heilman, R. M., Crişan, L. G., Houser, D., Miclea, M., & Miu, A. C. (2010). Emotion regulation and decision-making under risk and uncertainty. *Emotion*, *10*, 257–265.
- Hellén, K., & Sääksjärvi, M. (2013). Development of a scale measuring childlike anthropomorphism in products. *Journal of Marketing Management*, *29*, 141–157.
- Hofstede, G., Hofstede, G. J., & Minkov, M. (2010). *Cultures and organizations: Software of the mind*. New York, NY: McGraw-Hill.
- Hofstee, W. K., De Raad, B., & Goldberg, L. R. (1992). Integration of the big five and circumplex approaches to trait structure. *Journal of Personality and Social Psychology*, *63*, 146–163.
- Hudders, L., De Backer, C., Fisher, M., & Vyncke, P. (2014). The rival wears Prada: Luxury consumption as a female competition strategy. *Evolutionary Psychology*, *12*, 570–587.
- Iacobucci, D. (2010). Structural equations modeling: Fit indices, sample size, and advanced topics. *Journal of Consumer Psychology*, *20*, 90–98.
- Insel, T. R. (2000). Toward a neurobiology of attachment. *Review of General Psychology*, *4*, 176–185.
- Jackson, K. M. (2009). Hello Kitty in America. In M. I. West (Ed.), *The Japanification of children's popular culture: From Godzilla to Miyazaki* (pp. 25–40). Plymouth, England: Scarecrow.
- Jones, D. (1996). An evolutionary perspective on physical attractiveness. *Evolutionary Anthropology*, *5*, 97–111.
- Jones, D., Brace, C. L., Jankowiak, W., Laland, K. N., Musselman, L. E., Langlois, J. H., . . . Symons, D. (1995). Sexual selection, physical attractiveness, and facial neoteny: Cross-cultural evidence and implications [and comments and reply]. *Current Anthropology*, *36*, 723–748.
- Kamakura, W. A., & Du, R. Y. (2012). How economic contractions and expansions affect expenditure patterns. *Journal of Consumer Research*, *39*, 229–247.
- Keith, T. Z., Fehrman, P. G., Harrison, P. L., & Pottebaum, S. M. (1987). The relation between adaptive behavior and intelligence: Testing alternative explanations. *Journal of School Psychology*, *25*, 31–43.
- Keltikangas-Järvinen, L. (2001). Aggressive behaviour and social problem-solving strategies: A review of the findings of a seven-year follow-up from childhood to late adolescence. *Criminal Behaviour and Mental Health*, *11*, 236–250.
- Kidwell, B., Hardesty, D. M., Murtha, B. R., & Sheng, S. (2011). Emotional intelligence in marketing exchanges. *Journal of Marketing*, *75*, 78–95.
- Kim, K. H. (2005). The relation among fit indexes, power, and sample size in structural equation modeling. *Structural Equation Modeling*, *12*, 368–390.
- Klinger, E. (1969). Development of imaginative behavior: Implications of play for a theory of fantasy. *Psychological Bulletin*, *72*, 277–298.
- Kollmann, J. (1885). Das ueberwintern von Europaischen frosch- und tritonlarven und die umwandlung des Mexikanischen axolotl. *Verhandlungen der Naturforschenden Gesellschaft in Basel*, *7*, 387–398.
- Legg, S., & Hutter, M. (2007). A collection of definitions of intelligence. In B. Goertzel & P. Wang (Eds.), *Frontiers in artificial intelligence and applications* (Vol. 157, pp. 17–24). Amsterdam, NL: IOS Press.
- Lewis, C. C. (1981). How adolescents approach decisions: Changes over grades seven to twelve and policy implications. *Child Development*, *52*, 538–544.
- Lieberman, J. N. (1977). *Playfulness: Its relationship to imagination and creativity*. New York, NY: Academic Press.
- Lindahl, L. B., Heimann, M., & Ullstadius, E. (2003). Occurrence of regressive periods in the normal development of Swedish infants. In M. Heimann (Ed.), *Regression periods in human infancy* (pp. 41–55). New York, NY: Psychology Press.
- Looft, W. R. (1972). Egocentrism and social interaction across the life span. *Psychological Bulletin*, *78*, 73–92.
- Lorenz, K. (1971). *Studies in animal and human behavior*. Cambridge, MA: Harvard University.
- Louis, G. M. B., Gray, L. E., Marcus, M., Ojeda, S. R., Pescovitz, O. H., Witchel, S. F., . . . Bourguignon, J. P. (2008). Environmental factors and puberty timing: Expert panel research needs. *Pediatrics*, *121*, s192–s207.
- Løvtrup, S. (1978). Ontogeny and phylogeny. *Systematic Zoology*, *27*, 125–130.
- MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. *Psychological Methods*, *1*, 130–149.
- Macionis, N., & Sparks, B. (2009). Film-induced tourism: An incidental experience. *Tourism Review International*, *13*, 93–101.
- Mason, W. A. (1968). Scope and potential of primate research. In Jules H. Masserman (Ed.), *Animal and human* (pp. 101–118). New York, NY: Grune and Stratton.
- Matsumoto, D. (2006). Are cultural differences in emotion regulation mediated by personality traits? *Journal of Cross-Cultural Psychology*, *37*, 421–437.
- McKinney, M. L. (1999). Heterochrony: Beyond words. *Paleobiology*, *25*, 149–153.
- McKinney, M. L., & McNamara, K. J. (1991). *Heterochrony: The evolution of ontogeny*. New York, NY: Plenum.
- McShea, D. W., & Hordijk, W. (2013). Complexity by subtraction. *Evolutionary Biology*, *40*, 504–520.
- Mehrabian, A., & Russell, J. A. (1974). *An approach to environmental psychology*. Cambridge, MA: MIT.
- Miesler, L., Leder, H., & Herrmann, A. (2011). Isn't it cute: An evolutionary perspective of baby-schema effects in visual product designs. *International Journal of Design*, *5*, 17–30.
- Miller, D. C., & Byrnes, J. P. (1997). The role of contextual and personal factors in children's risk taking. *Developmental Psychology*, *33*, 814–823.
- Miyake, A., Friedman, N. P., Emerson, M. J., Witzki, A. H., Howerter, A., & Wager, T. D. (2000). The unity and diversity of executive functions and their contributions to complex “frontal lobe” tasks: A latent variable analysis. *Cognitive Psychology*, *41*, 49–100.

- Mize, J., & Cox, R. A. (1990). Social knowledge and social competence: Number and quality of strategies as predictors of peer behavior. *The Journal of Genetic Psychology, 151*, 117–127.
- Nettle, D. (2005). An evolutionary approach to the extraversion continuum. *Evolution and Human Behavior, 26*, 363–373.
- Obonsawin, M. C., Crawford, J. R., Page, J., Chalmers, P., Cochrane, R., & Low, G. (2002). Performance on tests of frontal lobe function reflect general intellectual ability. *Neuropsychologia, 40*, 970–977.
- Osborne, J. W., & Fitzpatrick, D. C. (2012). Replication analysis in exploratory factor analysis: What it is and why it makes your analysis better. *Practical Assessment, Research & Evaluation, 17*, 1–8.
- Payne, J. W., Bettman, J. R., & Johnson, E. J. (1988). Adaptive strategy selection in decision-making. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 14*, 534–552.
- Pellegrini, A. D., & Bjorklund, D. F. (2004). The ontogeny and phylogeny of children's object and fantasy play. *Human Nature, 15*, 23–43.
- Pellegrini, A. D., & Smith, P. K. (1998). Physical activity play: The nature and function of a neglected aspect of play. *Child Development, 69*, 577–598.
- Petanjek, Z., Judaš, M., Šimić, G., Rašin, M. R., Uylings, H. B., Rakic, P., & Kostović, I. (2011). Extraordinary neoteny of synaptic spines in the human prefrontal cortex. *Proceedings of the National Academy of Sciences, 108*, 13281–13286.
- Piaget, J. (1927/1997). *The child's conception of the World*. London, England: Routledge.
- Piaget, J. (1945/1999). *Play, dreams, and imitation in childhood*. London, England: Routledge.
- Plooij, F. X., & van de Rijt-Plooij, H. H. (1989). Vulnerable periods during infancy: Hierarchically reorganized systems control, stress, and disease. *Ethology and Sociobiology, 10*, 279–296.
- Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*, 879–903.
- Raine, A., Reynolds, C., Venables, P. H., & Mednick, S. A. (2002). Stimulation seeking and intelligence: A prospective longitudinal study. *Journal of Personality and Social Psychology, 82*, 663–674.
- Rhodes, G. (2006). The evolutionary psychology of facial beauty. *Annual Review of Psychology, 57*, 199–226.
- Roth, G., Nishikawa, K. C., Naujoks-Manteuffel, C., Schmidt, A., & Wake, D. B. (1993). Paedomorphosis and simplification in the nervous system of salamanders. *Brain, Behavior and Evolution, 42*, 162–170.
- Rothenberg, B. B. (1970). Children's social sensitivity and the relationship to interpersonal competence, intrapersonal comfort, and intellectual level. *Developmental Psychology, 2*, 335–350.
- Saad, G. (2007). *The evolutionary bases of consumption*. Mahwah, NJ: Lawrence Erlbaum.
- Saad, G., & Gill, T. (2000). Applications of evolutionary psychology in marketing. *Psychology and Marketing, 17*, 1005–1034.
- Scherpenzeel, A. C., & Saris, W. E. (1997). The validity and reliability of survey questions: A meta-analysis of MTMM studies. *Sociological Methods & Research, 25*, 341–383.
- Shea, B. T. (1989). Heterochrony in human evolution: The case for neoteny reconsidered. *American Journal of Physical Anthropology, 32*, 69–101.
- Singh, D. (1993). Adaptive significance of female physical attractiveness: Role of waist-to-hip ratio. *Journal of Personality and Social Psychology, 65*, 293–307.
- Slaby, R. G., & Guerra, N. G. (1988). Cognitive mediators of aggression in adolescent offenders: I. *Assessment. Developmental Psychology, 24*, 580–588.
- Somel, M., Franz, H., Yan, Z., Lorenc, A., Guo, S., Giger, T., . . . Webster, M. J. (2009). Transcriptional neoteny in the human brain. *Proceedings of the National Academy of Sciences, 106*, 5743–5748.
- Steinberg, L. (2005). Cognitive and affective development in adolescence. *Trends in Cognitive Sciences, 9*, 69–74.
- Stipek, D. (1984). Young children's performance expectations: Logical analysis or wishful thinking? In J. G. Nicholls (Ed.), *Advances in motivation and achievement: The development of achievement motivation* (Vol. 3, pp. 33–56). Greenwich, CT: JAI Press.
- Sutton-Smith, B. (1997). *The ambiguity of play*. Cambridge, MA: Harvard University.
- van de Rijt-Plooij, H. H., & Plooij, F. X. (1992). Infantile regressions: Disorganization and the onset of transition periods. *Journal of Reproductive and Infant Psychology, 10*, 129–149.
- Vincke, E. (2016). The young male cigarette and alcohol syndrome: Smoking and drinking as a short-term mating strategy. *Evolutionary Psychology, 14*, 1–13.
- Vygotsky, L. S. (1930/2004). Imagination and creativity in childhood. *Journal of Russian and East European Psychology, 42*, 7–97.
- Vygotsky, L. S. (1931/1991). Imagination and creativity in the adolescent. *Soviet Psychology, 29*, 73–88.
- Vygotsky, L. S. (1933/1967). Play and its role in the mental development of the child. *Soviet Psychology, 5*, 6–18.
- Waytz, A., Cacioppo, J., & Epley, N. (2010). Who sees human? The stability and importance of individual differences in anthropomorphism. *Perspectives on Psychological Science, 5*, 219–232.
- Waytz, A., Heafner, J., & Epley, N. (2014). The mind in the machine: Anthropomorphism increases trust in an autonomous vehicle. *Journal of Experimental Social Psychology, 52*, 113–117.
- Wolf, E. J., Harrington, K. M., Clark, S. L., & Miller, M. W. (2013). Sample size requirements for structural equation models: An evaluation of power, bias, and solution propriety. *Educational and Psychological Measurement, 73*, 913–934.
- Wolfenstein, M. (1951). The emergence of fun morality. *Journal of Social Issues, 7*, 15–25.
- Woodside, A. G. (2010). *Case study research*. Bingley, England: Emerald.
- Yano, C. R. (2009). Wink on pink: Interpreting Japanese cute as it grabs the global headlines. *The Journal of Asian Studies, 68*, 681–688.