



REG-14308954

MAUBTS

NLM -- W1 J0612DEF (Gen)

Brandeis University Libraries
 Goldfarb Library, 69-236
 P.O. Box 549110, 415 South Street
 Waltham, MA 02454-9110

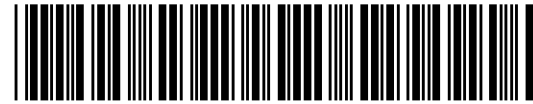
ATTN:	SUBMITTED:	2008-01-15 15:36:04
PHONE: 781-736-7777	PRINTED:	2008-01-16 09:43:40
FAX: 781-736-4675	REQUEST NO.:	REG-14308954
E-MAIL: illbrandeis@brandeis.edu	SENT VIA:	DOCLINE
	DOCLINE NO.:	KYB-24059273

REG	Copy	Journal
-----	------	---------

TITLE:	JOURNAL OF CULTURAL AND EVOLUTIONARY PSYCHOLOGY
PUBLISHER/PLACE:	Akademiai Kiado Budapest :
VOLUME/ISSUE/PAGES:	2004;2(1):93-E.O.A. 93-E.O.A.
DATE:	2004
AUTHOR OF ARTICLE:	NOT GIVEN
TITLE OF ARTICLE:	THE ORIGIN OF FIRST IMPRESSIONS
ISSN:	1589-5254
OTHER NUMBERS/LETTERS:	Unique ID.: 101207865 KYB-24059273
SOURCE:	Unique Key
MAX COST:	\$14.00
COPYRIGHT COMP.:	Guidelines
CALL NUMBER:	W1 J0612DEF (Gen)
NOTES:	JTV
REQUESTER INFO:	ZEBRWITZ, LESLIE TN:22368
DELIVERY:	Ariel: 129.64.16.3
REPLY:	Mail:

NOTE:-THIS MATERIAL MAY BE PROTECTED BY COPYRIGHT LAW (TITLE 17, U.S. CODE)

NLM Collection Access Section, Bethesda, MD



REG-14308954

KEEP THIS RECEIPT TO RECONCILE WITH BILLING STATEMENT

For problems or questions, contact NLM at http://wwwcf.nlm.nih.gov/ill/ill_web_form.cfm or phone 301-496-5511.

Include LIBID and request number.

NOTE:-THIS MATERIAL MAY BE PROTECTED BY COPYRIGHT LAW (TITLE 17, U.S. CODE)

NLM Collection Access Section, Bethesda, MD

University Press.
Nature, 4, 237–269.
Studies in Cognitive Sciences,
 disease and medicine. *Bio-*
Psychology and Social

THE ORIGIN OF FIRST IMPRESSIONS

LESLIE A. ZEBROWITZ*

Brandeis University

Abstract. Four face overgeneralization hypotheses are offered to explain consensual first impressions of faces. These hypotheses hold that the psychological qualities that are accurately revealed by the functionally significant facial qualities that mark babies, emotion, a familiar identity, or unfitnes are overgeneralized to people whose facial structure resembles that of babies, a particular emotion, a particular identity, or a particular level of fitness. Research supporting the first three hypotheses is briefly reviewed and recent studies supporting the fourth, anomalous face overgeneralization hypothesis, are discussed in more detail. The results supported the hypothesis that accurate impressions of faces that signal low fitness are overgeneralized. Traits indicative of fitness were accurately perceived to vary from low to moderate levels of attractiveness or average-ness in a representative sample, while they were erroneously perceived to vary from moderate to high levels, and impressions of the fitness of normal faces were predicted by their resemblance to anomalous ones. The present findings reveal the value of evolutionary theory and ecological theory for generating hypotheses that elucidate the origin of consensual first impressions, a socially significant topic that is less readily addressed within a traditional social cognition framework.

Keywords: first impressions, face perception, overgeneralization, attractiveness

THE ORIGIN OF FIRST IMPRESSIONS

Cultural wisdom enjoins us not to 'judge a book by its cover', an admonition suggesting that our natural proclivity is in fact to judge people by their appearance. Considerable research has shown that this is so. Not only do individuals make judgments about people from their facial appearance, but also there is a remarkable consensus in these judgments even when they are formed on the basis of black and white portrait photos with neutral expressions. This consensus encompasses impressions of psychological traits from a wide variety of domains, including social

* This article is based on a paper presented at the EAESP and Hungarian Academy of Sciences Small Group Meeting 'Social Cognition: Evolutionary and Cultural Perspectives', Budapest, Buda Castle, July 17–19, 2003. It incorporates data reported by ZEBROWITZ, FELLOUS, MIGNAULT and ANDREOLETTI (2003) and by ZEBROWITZ and RHODES (in press); The research was supported by NSF grant 97-08619 and NIH grant R01MH066836.

1589–5254/\$20 © Akadémiai Kiadó, Budapest

power, social warmth, honesty, physical fitness and intellectual competence (cf. ZEBROWITZ, 1997; ZEBROWITZ and COLLINS 1997). Moreover, these consensual trait impressions are robust across raters and targets. In particular, young children form impressions that agree with those made by adults (KEATING and BAI 1986; MONTEPARE and ZEBROWITZ-McARTHUR 1989) and raters from different ethnic backgrounds show agreement in their first impressions whether they are judging faces from their own or different groups (DION, 2002; ZEBROWITZ, MONTEPARE and LEE 1993). The question remains as to why people use facial appearance in first impressions and how they achieve a consensus.

ZEBROWITZ (1996, 1997) has proposed a set of overgeneralization hypotheses to explain consensual first impressions. These hypotheses are grounded in the ecological theory of social perception (McARTHUR and BARON 1983), which is derived from GIBSON'S (1966, 1979) theory of object perception. GIBSON argued that 'perceiving is for doing' and he emphasized the co-evolution of perceptual systems and ecological niches. Consistent with these tenets, social perception is assumed to serve an *adaptive* function. The presumed species' wide adaptive functions of social perception has generated novel predictions regarding what facial qualities predict consensual first impressions as well as when and why first impressions will be erroneous. In particular, the overgeneralization hypotheses hold that the psychological qualities that are accurately revealed by the functionally significant facial qualities that mark babies, unfitness, emotion, or identity are overgeneralized to people whose facial structure resembles that of babies, a particular level of fitness, a particular emotion, or a particular identity (cf. ZEBROWITZ 1996, 1997; ZEBROWITZ and COLLINS 1997). According to ecological theory, the errors shown in such overgeneralization effects occur because they are less maladaptive than those that might result from failing to respond appropriately to faces of a particular age, health status, emotional state, or identity.

The ecological approach to social knowledge can be contrasted with social cognition and evolutionary perspectives. In contrast to social cognition approaches that often emphasize the arbitrary social construction of social knowledge, the ecological approach regards social knowledge as serving an *adaptive* function either for the survival of the species or for the goal attainment of individuals. According to the overgeneralization hypotheses, facial configurations that elicit culturally universal consensual responses reveal an evolved mechanism that serves some species-wide adaptive function. The ecological theory assumption that social judgments serve an adaptive function for species survival parallels the evolutionary perspective. However, the assumption that social judgments serve an adaptive function for the goal attainment of *individuals* as well as the *species* goes beyond that perspective. According to this tenet of ecological theory, individuals' attunement to the social affordances revealed by various configurations of stimulus information can be educated

in a process perceivers' psychological approach to recognition and appraisal of facial information. This theory is based on evolutionary perspective and circuitry by and TOOBY 1

In sum, the generalization of adaptive functions from any species to human cognition approach in emphasizing these attributes will briefly reference, following the anomalous attractiveness

The evolution of strong preparedness (TENGER 1980). Consistent with the idea of babyfaced faces (ENLOW and BABYFACED ADAPTATION ZEBROWITZ 1997) these impressions are formed by MONTEPARE 1997. Babyfaced individuals are more likely to be perceived as having positive intentions of their faces (BROWNLOW, LEE, TACKET and F 1995; COLLINS

lectual competence (cf. er, these consensual trait lar, young children form B and BAI 1986; MONTE- erent ethnic backgrounds judging faces from their PARE and LEE 1993). The in first impressions and

eralization hypotheses to grounded in the ecologi- 3), which is derived from v argued that 'perceiving utual systems and ecolog- n is assumed to serve an ctions of social percep- qualities predict consen- ssions will be erroneous. e psychological qualities facial qualities that mark d to people whose facial ess, a particular emotion, WITZ and COLLINS 1997). overgeneralization effects ight result from failing to status, emotional state, or

trasted with social cogni- cognition approaches that knowledge, the ecological function either for the sur- ls. According to the over- t culturally universal con- serves some species-wide social judgments serve an ionary perspective. How- tive function for the goal ond that perspective. Ac- nement to the social affor- ormation can be educated

in a process of perceptual development, and this development varies as a function of perceivers' perceptual experiences, behavioral capabilities and social goals. The ecological approach also departs from the emphasis on cognitive processes in social cognition approaches, focusing instead on specifying the *structured external stimulus information* that influences social judgments. This focus is shared by the evolutionary perspective, which assumes that one can learn about an organism's neural circuitry by identifying the stimuli that elicit certain behavioral reactions (COSMEDES and TOOBY 1997).

In sum, the general ecological approach to social perception and the specific overgeneralization hypotheses differ from the evolutionary approach in specifying an adaptive function of social judgments for the goal attainment of *individuals* apart from any species' adaptive function. The ecological approach differs from the social cognition approach in assuming that social judgments reflect evolved adaptations and in emphasizing an understanding the external stimuli that inform those judgments. These attributes are shared by evolutionary psychology. The remainder of this chapter will briefly review three overgeneralization hypotheses together with supporting evidence, followed by a more detailed discussion of recent research pertinent to a fourth, the anomalous face overgeneralization hypothesis, which bears on the issue of facial attractiveness that has been of great interest to evolutionary theorists.

OVERGENERALIZATION HYPOTHESES

Babyface Overgeneralization Hypothesis

The evolutionary importance of responding appropriately to babies has produced a strong preparedness to respond to their facial qualities (TODD, MARK, SHAW and PITTINGER 1980) that is overgeneralized to those whose faces merely resemble babies. Consistent with this hypothesis, the facial qualities that mark babyfaced adults, such as round face, large eyes, high eyebrows, small chin and nose bridge, also mark real babies (ENLOW 1990) and the actual traits of babies are mirrored by impressions of babyfaced adults as physically weak, submissive and naïve (see MONTEPARE and ZEBROWITZ 1998 and ZEBROWITZ 1997 for comprehensive reviews). These impressions are formed of babyfaced individuals across the lifespan (ZEBROWITZ and MONTEPARE 1992) and across cultures (ZEBROWITZ, MONTEPARE and LEE 1993). Babyfaced individuals also receive social outcomes that are consistent with impressions of their traits in interpersonal interactions (e.g., BERRY and LANDRY 1997; BROWNLOW, 1992; ZEBROWITZ, BROWNLOW and OLSON, 1992; ZEBROWITZ KENDALL-TACKET and FAFEL 1991); in employment settings (e.g., COPLEY and BROWNLOW 1995; COLLINS and ZEBROWITZ 1995; PETTIJOHN and TESSER 1999); ZEBROWITZ,

TENNENBAUM and GOLDSTEIN 1991) and in criminal justice decisions (BERRY and ZEBROWITZ-McARTHUR 1988; ZEBROWITZ and McDONALD 1991) (cf. MONTEPARE and ZEBROWITZ 1998; ZEBROWITZ 1997 for reviews). Moreover, connectionist modeling research has demonstrated that adult faces that produced greater activation of a neural network output unit trained to respond to faces of babies rather than adults were perceived as more babyfaced, warm, physically weak, naïve and submissive, the same traits that differentiated ratings of real babies vs. adults, and these effects remained when attractiveness and smiling ratings were controlled (ZEBROWITZ et al. 2003). Thus, consensual impressions of people's warmth, physical strength, dominance and shrewdness, can be partly explained by a babyface overgeneralization effect.

Emotion Face Overgeneralization Hypothesis

The adaptive value of responding appropriately to emotional expressions has produced a strong preparedness to respond to the facial qualities that reveal emotions that is overgeneralized to individuals whose facial structure resembles a particular emotional expression. Consistent with this hypothesis, trait impressions of faces do vary with their emotional expressions. For example, low as well as high intensity angry expressions create impressions of low affiliative traits (e.g. unsociable, unfriendly, unsympathetic, sly, cold), while happy expressions create impressions of high affiliative traits (HESS, BLAIRY and KLECK 2000; KNUTSON 1996). Not only do emotional expressions foster the inference of related traits, but also *neutral expressions* create trait impressions, consistent with the emotion overgeneralization hypothesis. For example, some neutral expression faces elicit consensual impressions of an angry demeanor and low affiliative traits; others elicit consensual impressions of a happy demeanor and high affiliative traits (MONTEPARE and DOBISH 2003). Connectionist modeling research also has demonstrated that impressions of faces with neutral emotional expressions vary with their resemblance to an emotion. More specifically, neutral faces that produced greater activation of a neural network output unit trained to respond to happy rather than angry faces were perceived as happier and warmer than those producing less activation of that output unit. These impressions remained when attractiveness, babyfacedness and smiling ratings were controlled, and they paralleled impressions of happy vs. angry faces (ZEBROWITZ and FELLOUS 2001). Thus, consensual impressions of happiness and affiliative traits in people with neutral expressions can be partly explained by an emotion overgeneralization effect.

The evolution of strangers and strangers to consequence judged similar do in fact depend expressed a someone who more closely (1985). People closely resemble that of a set the dimension

JOURARD 1956 In addition tion may also which show le strangers who more negative reaction times low prototypic er rated 'Afro ers not only w pean-American vs. different st effect.

The evolution has produced a mark low fitne whose facial process is prop for variations in trait impression intelligence and FIELD and SPRE

Facial Identity Overgeneralization Hypothesis

The evolutionary and social importance of differentiating known individuals from strangers and being wary of the latter has produced a tendency for responses to strangers to vary as a function of their facial resemblance to known individuals. One consequence is a 'mistaken identity' effect, whereby a familiar-looking stranger is judged similarly to a known individual. Research has shown that reactions to people do in fact depend on their facial resemblance to known others. For example, people expressed a preference for the job candidate whose face more closely resembled someone who had just treated them kindly and they avoided a stranger whose face more closely resembled someone who had just treated them irritably (LEWICKI 1985). People also expected greater fairness from a professor whose face more closely resembled the prototypical face of a set of professors known to be fair than that of a set known to be unfair, even though they had no conscious awareness of the dimension on which the faces varied (HILL et al. 1990; See also SECORD and JOURARD 1956; ANDERSEN and BERK 1998).

In addition to explaining such idiosyncratic impressions, identity overgeneralization may also contribute to consensual negative impressions of other race faces, which show less resemblance to known individuals. Consistent with this hypothesis, strangers whose faces are farther from the prototype of one's own racial group elicit more negative reactions. For example, high prototypical Black faces primed faster reaction times to negative nouns among White perceivers than did White faces or low prototypical Black faces (LIVINGSTON and BREWER 2002). Also, faces with higher rated 'Afrocentricism' elicited more negative trait attributions by White perceivers not only when the faces were African-American, but also when they were European-American (BLAIR et al. 2002). Thus, consensual impressions of racially similar vs. different strangers can be partly explained by a facial identity overgeneralization effect.

Anomalous Face Overgeneralization Hypothesis

The evolutionary importance of recognizing individuals with disease or bad genes has produced a strong preparedness to respond to anomalous facial qualities that can mark low fitness. These prepared responses are overgeneralized to normal adults whose facial structure resembles those who are unfit. This overgeneralization process is proposed to explain the attractiveness halo effect, which is the tendency for variations in facial attractiveness or its component qualities to be associated with trait impressions, such that less attractive individuals are perceived to lack health, intelligence and socially adaptive traits (EAGLY et al. 1991; FEINGOLD 1992; HATFIELD and SPRECHER 1986; KALICK et al. 1998; RHODES et al. 2003; ZEBROWITZ et al.

2002). (For related discussions, see ENQUIST et al. 2002; KURZBAN and LEARY 2001; NEUBERG, SMITH and ASHER 2000; PARK, FAULKNER and SCHALLER 2003).

Bad Genes Hypothesis. Implicit in the anomalous face overgeneralization hypothesis is the 'bad genes' hypothesis, which holds that unattractive faces signal low fitness and low mate quality (ZEBROWITZ and RHODES 2002). For example, individuals with Down's syndrome are marked by faces that are atypical or asymmetrical, two hallmarks of unattractiveness and they also suffer from various physical and intellectual disabilities. More subtle deviations from average attractiveness also can signal low fitness. For example, 'minor facial anomalies' and facial characteristics associated with 'fetal alcohol syndrome' may be diagnostic of low intelligence and other maladaptive traits (BELL and WALDROP 1982; CAMPBELL et al. 1978; CUMMINGS, FLYNN and PREUS 1982; GUY et al. 1983; HOYME 1994; KROUSE and KAUFFMAN 1982; PAULHUS and MARTIN 1986; STREISSGUTH, HERMAN and SMITH 1982; THORNHILL and MØLLER 1997; WALDROP and HALVERSON 1972).

Good Genes Hypothesis. The bad genes hypothesis that low attractiveness signals low fitness is a refinement of the 'good genes' hypothesis that has been offered by some evolutionary theorists to explain facial preferences. According to this hypothesis, attractive faces signal high mate quality and preferences for attractiveness evolved because it enhanced reproductive success. On the good genes account, the halo effect in impressions of greater intelligence and health in more attractive faces is accurate, not an overgeneralization. Moreover, an assumption of a linear relationship between attractiveness or its components and genetic fitness has been implicit in the research generated by the good genes hypothesis and there has been particular emphasis on the greater mate quality of those who are highly attractive (e.g., BUSS 1989; THORNHILL and GANGESTAD 1999).

Facial Indicators of Fitness. Consistent with both the good and the bad genes hypothesis is evidence that components of attractiveness, symmetry and averageness, are associated with the ability to maintain normal development despite environmental and/or genetic stress in non-human animals (MØLLER and SWADDLE 1997; PARSONS 1990; THORNHILL and MØLLER 1997) and also by evidence that genetic and environmental stress can produce deviations from averageness and symmetry in the human face (THORNHILL and MØLLER 1997). Facial averageness also may be associated with the ability to resist parasites (GANGESTAD and BUSS 1993; THORNHILL and GANGESTAD 1993), because the genetic heterozygosity that is associated with enhanced parasite resistance also tends to produce average forms (LIVSHITS and KOBLYANSKY 1991). Sexual dimorphism is another facial quality that has been hypothesized to be a marker of good genes, at least in males, because testosterone not only produces secondary sexual traits, such as a large jaw, but also inhibits immune responses with the result that only very fit individuals may be able to 'afford' these traits (FOLSTAD and KARTER 1992; MØLLER, CHRISTE and LUX 1999).

JCEP 2(2004)1-2

While there
hypothesis a
there are also
regarding ju

1. According
averageness
health wh
not when
good gene
facial dist
2. According
judged fr
attractiveness
the unqua
tire range
3. According
and its co
both for
those that
predicted
4. According
intelligence
blance to

ARCH

The first thr
ously yielde
intelligence-
nent qualitie
press). The
as well as th

ZBAN and LEARY 2001; ALLER 2003).

Overgeneralization hypothesis predicts that attractive faces signal low fitness. For example, individuals with a more symmetrical, two-dimensional or asymmetrical, two-dimensional face have more positive physical and intellectual characteristics also can signal high attractiveness. Facial characteristics such as low intelligence and health (BELL et al. 1978; CUMMINGS 1994; KROUSE and KAUFFMAN and SMITH 1982; ZEBROWITZ 2002).

Low attractiveness signals low intelligence and health. That has been offered by the overgeneralization hypothesis. According to this hypothesis, differences in attractiveness for attractiveness. If the good genes account, the more attractive faces signal a linear relationship between attractiveness and intelligence. It has been implicit here that there has been particular evidence for particularly attractive (e.g., BUSS

and the bad genes hypothesis. Symmetry and averageness develop despite environmental influences (LEWIS and SWADDLE 1997; Evidence that genetic and environmental influences on averageness and symmetry in the face also may be associated with intelligence (SIMPSON 1993; THORNHILL and ZEBROWITZ 2002). It is associated with intelligence and health forms (LIVSHITS and ZEBROWITZ 2002). Facial quality that has been argued, because testosterone increases jaw size, but also inhibits facial attractiveness. Individuals may be able to predict intelligence and health (CHRISTIE and LUX 1999).

While there are similarities in the fundamental assumptions made by the good genes hypothesis and by the bad genes and anomalous face overgeneralization hypotheses, there are also significant differences, which are reflected in the following predictions regarding judgments of health and intelligence from facial photographs.

Predictions

1. According to the bad genes hypothesis, attractiveness and its components (facial averageness, symmetry, masculinity) will provide valid cues to intelligence or health when faces range from medium to low levels of these facial qualities but not when they range from medium to high levels. According to the unqualified good genes hypothesis, cue validity should be shown across the entire range of the facial distributions.
2. According to the bad genes hypothesis, intelligence and health will be accurately judged from facial photographs when faces range from medium to low levels of attractiveness but not when they range from medium to high levels. According to the unqualified good genes hypothesis, accuracy should be shown across the entire range of the facial distributions.
3. According to the anomalous face overgeneralization hypothesis, attractiveness and its components will be utilized as cues when judging intelligence and health both for faces that range from medium to low levels of these qualities and for those that range from medium to high levels. Such cue utilization would also be predicted from the unqualified good genes hypothesis.
4. According to the anomalous face overgeneralization hypothesis, judgments of the intelligence and health of normal adult faces will be predicted by their resemblance to anomalous faces.

ARCHIVAL EVIDENCE FOR BAD GENES AND ANOMALOUS FACE OVERGENERALIZATION

Overview

The first three hypotheses were tested by reanalyzing archival data that had previously yielded evidence for cue validity, accuracy and/or cue utilization in judging intelligence or health from facial images that varied in attractiveness or its component qualities of symmetry, averageness, or masculinity (ZEBROWITZ and RHODES, in press). The validity of various facial qualities for predicting intelligence and health as well as the utilization of these cues and the accuracy of impressions of these adap-

tive attributes were assessed separately for faces ranging from medium to low levels and from medium to high levels of the facial qualities. To this end, faces were divided into two groups – those at or below the median in the facial quality (designated ‘below the median’) and those at or above the median (designated ‘above the median’) in the facial quality. Analyses are reported only for comparisons that had shown cue validity or accuracy in prior research with all faces combined.

Measures

Attractiveness ratings came from ZEBROWITZ, OLSON and HOFFMAN (1993). Facial averageness and symmetry ratings came from RHODES et al. (2001). Masculinity-Femininity ratings came from RHODES et al. (2003). Perceived health ratings came from Kalick et al., (1998) and perceived intelligence ratings came from ZEBROWITZ, HALL, MURPHY and RHODES (2002). All ratings were made on 7-point bipolar scales and all showed high inter-rater agreement. Actual health scores were taken from KALICK et al. (1998) and IQ scores were taken from ZEBROWITZ et al. (2002).

Cue Validity

To test the bad genes hypothesis that attractiveness and its components will provide valid cues to intelligence or health when faces range from medium to low levels of the relevant facial quality but not when they range from medium to high levels, we assessed the correlations between facial qualities and measured intelligence or health at both ends of the appearance distributions.

Intelligence. As predicted, there was a significant positive relationship between attractiveness and IQ scores for participants below the median in attractiveness in childhood, puberty, or adulthood, replicating the findings reported by ZEBROWITZ et al. (2002) for all participants combined. Similarly, there was a significant positive relationship between facial averageness and IQ scores for participants below the median in averageness in puberty and between facial symmetry and IQ scores for participants below the median in symmetry in childhood, replicating the corresponding findings of ZEBROWITZ et al. (2002) for all participants combined. Also as predicted, attractiveness and IQ scores were uncorrelated for those above the median in attractiveness in childhood, puberty, or adulthood; averageness and IQ scores were uncorrelated for those above the median in averageness in puberty; and symmetry and IQ scores were uncorrelated for those above the median in facial symmetry in childhood.

Health. Cue validity supported the bad genes hypothesis in predictions of health as well as IQ scores. There was a significant positive relationship between women’s

facial averageness
geness, replicating
combined, but not f
itive relationship be
participants below
RHODES et al. (200
median.

To test the second
from facial photogr
ness but not when
tions between perce
tractiveness distribu

Intelligence. As
actual IQ scores wa
in childhood, puber
ZEBROWITZ et al. (2
relation between pe
accuracy for partici

Health. The corr
showed the predict
significantly correla
ence, replicating t
combined, whereas
not accurate for tho

To test the third hyp
utilization of facial
tions between facial
ization hypothesis,
perceived health and
butions as for those
valid cue to intelligen
childhood, puberty a
and below the media

facial averageness and health scores at age 17 for faces below the median in averageness, replicating the findings of RHODES et al. (2001) for all female participants combined, but not for faces above the median. Similarly, there was a significant positive relationship between men's facial masculinity and adolescent health scores for participants below the median in facial masculinity, replicating the findings of RHODES et al. (2003) for all male participants combined, but not for faces above the median.

Impression Accuracy

To test the second hypothesis that intelligence and health will be accurately judged from facial photographs when faces range from medium to low levels of attractiveness but not when they range from medium to high levels, we assessed by correlations between perceived and measured intelligence or health at both ends of the attractiveness distribution.

Intelligence. As predicted, the correlation between perceived intelligence and actual IQ scores was significant for participants below the median in attractiveness in childhood, puberty and adulthood. These results replicate the findings reported by ZEBROWITZ et al. (2002) for all participants combined. Also as predicted, the correlation between perceived intelligence and actual IQ scores showed no evidence of accuracy for participants above the median in attractiveness.

Health. The correlations between perceived health and actual health scores also showed the predicted pattern. Perceived health and adolescent health scores were significantly correlated for adolescents below the median in attractiveness in adolescence, replicating the findings reported by KALICK et al. (1998) for all adolescents combined, whereas the correlation between perceived and actual health scores were not accurate for those above the median in attractiveness.

Cue Utilization

To test the third hypothesis that perceivers would show overgeneralization in their utilization of facial cues when judging intelligence or health, we assessed correlations between facial qualities and these judgments. Consistent with the overgeneralization hypothesis, facial qualities were as likely to be significantly correlated with perceived health and intelligence for faces in the upper half of the appearance distributions as for those in the lower half. Most notably, whereas attractiveness was a valid cue to intelligence only for participants below the median in attractiveness in childhood, puberty and adulthood, it was utilized as a cue for participants both above and below the median. Also consistent with the overgeneralization hypothesis, facial

averageness was significantly correlated with perceived health for female faces below the median as well as for those above the median, despite serving as a valid cue to health only for faces below the median. An exception to the overgeneralization effect occurred for the impression of intelligence from facial symmetry in childhood. Just as facial symmetry was a valid cue to children's IQ scores only for those below the median in symmetry, so was it utilized in judging intelligence only for children below the median, but not for those above the median. Paradoxically, whereas averageness was a valid cue to intelligence in puberty only for participants below the median, it was utilized as a cue when perceiving the intelligence of participants *above* the median, consistent with the overgeneralization hypothesis, but not participants below the median. Finally, facial masculinity was not significantly utilized when judging the health of participants below or above the median.

CONNECTIONIST MODELING EVIDENCE FOR ANOMALOUS FACE OVERGENERALIZATION

Overview

To test the fourth hypothesis that judgments of the intelligence and health of normal adult faces will be predicted by their resemblance to anomalous faces, we used connectionist modeling (ZEBROWITZ et al. 2003). This method was employed because the essence of the overgeneralization hypotheses is that first impressions of people can derive from their facial resemblance to particular categories of faces (e.g., anomalous ones) and this type of similarity-based generalization is a natural property of connectionist models. In particular, connectionist networks that have been trained to discriminate anomalous from normal faces will react to untrained, test, faces according to their similarity to anomalous vs. normal ones. Network activation to the untrained faces captures the network's overgeneralization of veridical fitness information to those faces.

Method

The training faces included 60 anomalous faces (30 men) drawn from atlases depicting birth defects and syndromes characterized by facial deformities and 60 normal faces (30 men) of average attractiveness drawn from a representative sample of individuals who had previously been rated on attractiveness (ZEBROWITZ, OLSON and HOFFMAN 1993). The test faces included 80 normal faces (40 men) drawn from the same sample as the normal training faces. Ratings of attractiveness were in the top 20% of their sex for half of the normal faces and in the bottom 20% for the other

half. Normalized high agreement networks, and was highly successful for various traits and agreement.

Predicting

Multiple regression test faces vary in activated the test by the overgeneralization the anomaly of anomalous faces. In were perceived warm and strong

According to the below average intelligence, as subtle anomalies. In the connectionist and attractive test faces to assess could be accurate the 80 faces and these actual scores procedure outlined the relationship IQ scores did not

health for female faces despite serving as a valid test to the overgeneralization hypothesis. IQ scores were provided only for those faces above the median. Paradoxically, IQ scores were only for participants above the median intelligence of participants. The overgeneralization hypothesis, but not the accuracy hypothesis, was not significantly supported for the median.

ANOMALOUS

Health and intelligence of normal faces, we used convolutional neural networks as employed because they produce impressions of people from faces (e.g., anomalies) as a natural property of the network that have been trained to detect anomalies. Test faces according to network activation to the unit that indicate radical fitness information.

Drawn from atlases depicting facial anomalies and 60 normal faces, a representative sample of individuals (ZEBROWITZ, OLSON and OLSON) men) drawn from the top 20% of attractiveness were in the top 20% for the other

half. Normalized facial metrics generated from 64 points marked on each face with high agreement by two judges were used as inputs to standard backpropagation neural networks, and training the network to differentiate anomalous from normal faces was highly successful. Ratings of facial attractiveness, babyfacedness, smiling and various traits were provided on 7-point scales. All ratings showed high inter-rater agreement.

Predicting Trait Impressions from Anomalous Face Overgeneralization

Multiple regression analyses determined whether impressions of normal young adult test faces varying in attractiveness could be predicted from the extent to which they activated the trained anomaly output unit, controlling for sex of face. As predicted by the overgeneralization hypothesis, test faces that produced higher activation of the anomaly unit created impressions that paralleled those created by truly anomalous faces. In particular, those faces eliciting greater activation of the anomaly unit were perceived as less healthy and less intelligent, as well as less attractive, sociable, warm and strong, effects that were independent of babyfacedness and smiling.

Overgeneralization or Accuracy?

According to the bad genes hypothesis, faces in a *representative* sample that are below average in attractiveness could actually signal lower than average health and intelligence, as they did in the analysis of the archival data reported above, because subtle anomalies are diagnostic of low fitness in faces that appear relatively normal. In the connectionist modeling experiment, we deliberately matched the unattractive and attractive test faces in health and intelligence in order to examine overgeneralization effects. Nevertheless, we used measures of actual traits available for the test faces to assess the possibility that the impressions predicted from network activation could be accurate rather than overgeneralizations. IQ scores were available for 79 of the 80 faces and measures of real health were available for all faces. We included these actual scores in a second set of regression analyses, and we followed the procedure outlined by BARON and KENNY (1986) to determine whether they mediated the relationship between anomaly unit activation and impressions. Actual health and IQ scores did not qualify as mediators of the corresponding impressions.

SUMMARY OF EVIDENCE FOR BAD GENES AND ANOMALOUS FACE OVERGENERALIZATION

The present findings provide strong support for the bad genes refinement of the good genes hypothesis as well as for the anomalous face overgeneralization hypothesis. Consistent with the bad genes hypothesis, low facial attractiveness, averageness, symmetry, or masculinity in representative samples predicted traits indicative of low fitness, whereas high levels of these facial qualities did not predict high fitness. Consistent with the anomalous face overgeneralization hypothesis, traits indicative of fitness were perceived to vary not only from low to moderate levels of attractiveness or averageness, but also from moderate to high levels. Also consistent with the overgeneralization hypothesis, impressions of the health and intelligence of normal faces were predicted by the extent to which they resembled anomalous ones, effects that could not be explained by corresponding variations in the actual health and intelligence of the normal faces. The overgeneralization effects in impressions of faces across the entire range of attractiveness can account for the finding that perceivers accurately judged health and intelligence when faces were low to moderate in attractiveness or averageness, when these facial qualities provided valid cues, but not when they were moderate to high, when the facial cues were not valid indicators of adaptive traits. These errors suggest that people may not 'simply avoid the worst' (cf. GRAMMER et al. 2002), although such a strategy would be sufficient for selecting healthy and intelligent mates. Although the present data are in agreement with the argument that there was little need to select the most attractive mates to ensure viable progeny in our evolutionary past because the vast majority of sexually mature people are capable of producing healthy offspring (HAZAN and DIAMOND 2000), they also indicate that anomalous face overgeneralization may have fostered such selection.

GENERAL CONCLUSIONS

The proclivity for reading faces prevails across the lifespan, across cultures and across historical eras (ZEBROWITZ 1997). Some universal process seems necessary to explain the ubiquity of reading faces and the consensual first impressions. The face overgeneralization hypotheses, derived from evolutionary principles and the ecological theory of social perception (MCARTHUR and BARON 1983), provide an explanation for these phenomena and the results reviewed in this article offer supporting evidence. Consensual impressions of unattractive people as physically, cognitively and socially deficient – a portion of the attractiveness halo effect – can be partly explained by an anomalous face overgeneralization effect. Other consensual impressions of faces can be explained by a babyface overgeneralization effect, an emotion

JCEP 2(2004)1–2

face overg
present fin
generating
socially sig
nition fram

ANDERSEN, S
periencing
BARON, R. M
psycholog
sonality an
BELL, R. Q. a
and G. M
Symposium
BERRY, D. S.
Personalit
BERRY, D. S.
rity and d
Psycholog
BLAIR, I., JUD
person per
Psycholog
BROWNLOW, S
Journal of
BUSS, D. M. (I
in 37 cultur
CAMPBELL, M
anomalies
COLLINS, M. a
comes in c
COPLEY, J. E.
warmth on
COSMIDES, L.
http://www
CUMMINGS, C.
with learni
DION, K. K.
Zebrowitz
port, CT: A
EAGLY, A. H.,
good: A me
logical Bull
ENLOW, D. H.

AND ANOMALOUS ON

nes refinement of the good generalization hypothesis. Attractiveness, averageness, and other traits indicative of low fitness do not predict high fitness. The hypothesis, traits indicative of low fitness, traits indicative of high fitness, is consistent with the over-intelligence of normal faces and the effects of anomalous ones, effects that are not predicted by the actual health and intelligence of the faces. The finding that perceivers are low to moderate in attractiveness, but not provided valid cues, but not were not valid indicators of attractiveness, 'simply avoid the worst' would be sufficient for selecting mates. This is in agreement with the theory of sexually mature people (DIAMOND 2000), they also have fostered such selection.

Span, across cultures and process seems necessary to first impressions. The face perception principles and the ecological (1983), provide an explanation. This article offer supporting evidence – physically, cognitively and effect – can be partly explained. Other consensual impressionization effect, an emotion

face overgeneralization effect and a facial identity overgeneralization effect. The present findings reveal the value of evolutionary theory and ecological theory for generating hypotheses that elucidate the origin of consensual first impressions, a socially significant topic that is less readily addressed within a traditional social cognition framework.

REFERENCES

- ANDERSEN, S. M. and BERK, M. S. (1998): The social-cognitive model of transference: Experiencing past relationships in the present. *Psychological Science*, 7, 109–115.
- BARON, R. M. and KENNY, D. A. (1986): The moderator-mediator variable distinction in social psychological research: Conceptual, strategic and statistical considerations. *Journal of Personality and Social Psychology*, 51, 1173–1182.
- BELL, R. Q. and WALDROP, M. F. (1982): Temperament and minor physical anomalies. In R. Porter and G. M. Collins (eds): *Temperamental Differences in Infants and Young Children: CIBA Symposium* (No. 89). London: Pitman, 206–220.
- BERRY, D. S. and LANDRY, J. C. (1997): Facial maturity and daily social interaction. *Journal of Personality and Social Psychology*, 72, 570–580.
- BERRY, D. S. and ZEBROWITZ-McARTHUR, L. (1988): What's in a face? The impact of facial maturity and defendant intent on the attribution of legal responsibility. *Personality and Social Psychology Bulletin*, 14, 23–33.
- BLAIR, I., JUDD, C. M., SADLER, M. S. and JENKINS, C. (2002): The role of afrocentric features in person perception: Judging by features and categories. *Journal of Personality and Social Psychology*, 83, 5–25.
- BROWNLOW, S. (1992): Seeing is believing: Facial appearance, credibility and attitude change. *Journal of Nonverbal Behavior*, 16, 101–115.
- BUSS, D. M. (1989): Sex differences in human mate preferences: Evolutionary hypotheses tested in 37 cultures. *Behavioural and Brain Sciences*, 12, 1–49.
- CAMPBELL, M., GELLER, B., SMALL, A. M., PETTI, T. A. and FERRIS, S. H. (1978): Minor physical anomalies in young psychotic children. *American Journal of Psychiatry*, 135, 573–575.
- COLLINS, M. and ZEBROWITZ, L. A. (1995): The contributions of appearance to occupational outcomes in civilian and military settings. *Journal of Applied Social Psychology*, 25, 129–163.
- COPELEY, J. E. and BROWNLOW, S. (1995): The interactive effects of facial maturity and name warmth on perceptions of job candidates. *Basic and Applied Social Psychology*, 16, 256–265.
- COSMIDES, L. and TOOBAY, J. (1997): *Evolutionary Psychology: A Primer*. <http://www.psych.ucsb.edu/research/cep/primer.html>
- CUMMINGS, C. D., FLYNN, D. and PREUS, M. (1982): Increased morphological variants in children with learning disabilities. *Journal of Autism and Developmental Disorders*, 12, 373–383.
- DION, K. K. (2002): Cultural perspectives on facial attractiveness. In G. Rhodes and L. A. Zebrowitz (eds): *Facial Attractiveness: Evolutionary, Cognitive and Social Perspectives*. Westport, CT: Ablex, 239–260.
- EAGLY, A. H., ASHMORE, R. D., MAKHJANI, M. G., and LONGO, L. C. (1991): What is beautiful is good: A meta-analytic review of research on the physical attractiveness stereotype. *Psychological Bulletin*, 110, 109–128.
- ENLOW, D. H. (1990): *Facial Growth* (3rd ed.). Philadelphia: Harcourt, Brace Jovanovich.

- ENQUIST, M., GHIRLANDA, S., LUNDQVIST, D. and WACHTMEISTER, C. A. (2002): An ethological theory of attractiveness. In G. Rhodes and L.A. Zebrowitz (eds): *Facial Attractiveness: Evolutionary, Cognitive, and Social Perspectives*. Westport, CT: Ablex, 127–152.
- FEINGOLD, A. (1992): Good-looking people are not what we think. *Psychological Bulletin*, 111, 304–341.
- FOLSTAD, I. and KARTER, A. J. (1992): Parasites, bright males and the immunocompetence handicap. *American Naturalist*, 139, 603–622.
- GANGESTAD, S. W. and BUSS, D. M. (1993): Pathogen prevalence and human mate preferences. *Ethology and Sociobiology*, 14, 89–96.
- GIBSON, J. J. (1979): *The Ecological Approach to Visual Perception*. Boston: Houghton Mifflin.
- GIBSON, J. J. (1996): *The Senses Considered as Perceptual Systems*. Boston: Houghton Mifflin.
- GOTTLIEB, G. (2000): Environmental and behavioral influences on gene activity. *Current Directions in Psychological Science*, 9, 93–97.
- GRAMMER, K., FINK, B., JUETTIE, A., RONZAL, G. and THORNHILL, R. (2002): Female faces and bodies: N-dimensional feature space and attractiveness. In G. Rhodes and L. A. Zebrowitz (eds): *Facial Attractiveness: Evolutionary, Cognitive, and Social Perspectives*. Westport, CT: Ablex, 91–125.
- GUY, J. D., MAJORSKI, L. V., WALLACE, C. J. and GUY, M. P. (1983): The incidence of minor physical anomalies in adult male schizophrenics. *Schizophrenia Bulletin*, 9, 571–582.
- HATFIELD, E. and SPRECHER, S. (1986): *Mirror, Mirror: The Importance of Looks in Everyday Life*. Albany: State University of New York Press.
- HAZAN, C. and DIAMOND, L. M. (2000): The place of attachment in human mating. *Review of General Psychology Special Issue: Adult Attachment*, 4, 186–204.
- HESS, U., BLAIRY, S. and KLECK, R. E. (2000): The influence of facial emotion displays, gender and ethnicity on judgments of dominance and affiliation. *Journal of Nonverbal Behavior*, 24, 265–283.
- HILL, T., LEWICKI, M., CZYZEWSKA, M. and SCHULLER, G. (1990): The role of learned inferential encoding rules in the perception of faces: Effects of nonconscious self-perpetuation of a bias. *Journal of Experimental Social Psychology*, 26, 350–371.
- HOYME, H. E. (1994): Minor anomalies: diagnostic clues to aberrant human morphogenesis. In T. A. Markow (ed.): *Developmental Instability: Its Origins and Evolutionary Implications*. The Netherlands: Kluwer Academic Publishers, 309–317.
- KALICK, S. M., ZEBROWITZ, L. A., LANGLOIS, J. H. and JOHNSON, R. M. (1998): Does human facial attractiveness honestly advertise health? Longitudinal data on an evolutionary question. *Psychological Science*, 9, 8–13.
- KEATING, C. F. and BAI, D. L. (1986): Children's attributions of social dominance from facial cues. *Child Development*, 57, 1269–76.
- KNUTSON, B. (1996): Facial expression of emotion influence interpersonal trait inferences. *Journal of Nonverbal Behavior*, 20, 165–182.
- KROUSE, J. P. and KAUFFMAN, J. M. (1982): Minor physical anomalies in exceptional children: A review and critique of research. *Journal of Abnormal Child Psychology*, 10, 247–264.
- KURZBAN, R. and LEARY, M. R. (2001): Evolutionary origins of stigmatization: The functions of social exclusion. *Psychological Bulletin*, 127, 187–208.
- LEWICKI, P. (1985): Nonconscious biasing effects of single instances on subsequent judgments. *Journal of Personality and Social Psychology*, 48, 563–574.
- LIVSHITS, G. and KOBYLANSKY, E. (1991): Fluctuating asymmetry as a possible measure of developmental homeostasis in humans: A review. *Human Biology*, 63, 441–466.

MCARTHUR, L. *Evolutionary Psychology*

MÖLLER, A. P. *Evolutionary Psychology*

MÖLLER, A. P. *Evolutionary Psychology*

MONTEPARE, J. M. *Evolutionary Psychology*

MONTEPARE, J. M. *Evolutionary Psychology*

MONTEPARE, J. M. *Evolutionary Psychology*

NEUBERG, S. L. *Evolutionary Psychology*

PARK, J. H., FAUPEL, J. L. *Evolutionary Psychology*

PARSONS, P. A. *Evolutionary Psychology*

PAULHUS, D. L. *Evolutionary Psychology*

PETTJOHN, T. F. *Evolutionary Psychology*

RHODES, G., ZEBROWITZ, L. A. *Evolutionary Psychology*

RHODES, G., CHAMBERLAIN, P. *Evolutionary Psychology*

SECOND, P. and JOHNSON, R. M. *Evolutionary Psychology*

STREISSGUTH, A. *Evolutionary Psychology*

TODD, J. T., MANNING, P. T. *Evolutionary Psychology*

THORNHILL, R. *Evolutionary Psychology*

THORNHILL, R. *Evolutionary Psychology*

THORNHILL, T. *Evolutionary Psychology*

WALDROP, M. F. *Evolutionary Psychology*

ZEBROWITZ, L. A. *Evolutionary Psychology*

- MCARTHUR, L. Z. and BARON, R. A. (1983): An ecological approach to social perception. *Psychological Review*, 90, 215–38.
- MØLLER, A. P. and SWADDLE, J. P. (1997): *Asymmetry, Developmental Stability and Evolution*. Oxford, England: Oxford University Press.
- MØLLER, A. P., CHRISTE, P. and LUX, E. (1999): Parasitism, host immune function and sexual selection. *Quarterly Review of Biology*, 74, 3–74.
- MONTEPARE, J. M. and DOBISH, H. (2003): The contribution of emotion perceptions and their over-generalizations to trait impressions. *Journal of Nonverbal Behavior*, 27, 237–254.
- MONTEPARE, J. M. and ZEBROWITZ-MCARTHUR, L. A. (1989): Children's perceptions of babyfaced adults. *Perceptual and Motor Skills*, 69, 467–72.
- MONTEPARE, J. M. and ZEBROWITZ, L. A. (1998): Person perception comes of age: The salience and significance of age in social judgments. In M. P. Zanna (ed.): *Advances in Experimental Social Psychology* (Vol. 30). Academic Press, 93–163.
- NEUBERG, S. L., SMITH, D. M. and ASHER, T. (2000): Why people stigmatize: Toward a biocultural framework. In T. Heatherton, R. Kleck, J. G. Hull and M. Hebl (eds): *The Social Psychology of Stigma*. New York: Guilford, 31–61.
- PARK, J. H., FAULKNER, J. and SCHALLER, M. (2003): Evolved disease-avoidance processes and contemporary anti-social behavior: Prejudicial attitudes and avoidance of people with physical disabilities. *Journal of Nonverbal Communication*, 27, 65–88.
- PARSONS, P. A. (1990): Fluctuating asymmetry: An epigenetic measure of stress. *Biological Reviews*, 65, 131–145.
- PAULHUS, D. L. and MARTIN, C. L. (1986): Predicting adult temperament from minor physical anomalies. *Journal of Personality and Social Psychology*, 50, 1235–39.
- PETTIOHN, T. F. and TESSER, A. (1999): Popularity in environmental context: Facial feature assessment of American movie actresses. *Media Psychology*, 1, 229–247.
- RHODES, G., ZEBROWITZ, L. A., CLARK, A., KALICK, S. M., HIGHTOWER, A. and MCKAY, R. (2001): Do facial averageness and symmetry signal health? *Evolution and Human Behavior*, 22, 31–46.
- RHODES, G., CHAN, J., ZEBROWITZ, L. A. and SIMMONS, L. W. (2003): Does sexual dimorphism in human faces signal health? *Proceedings of the Royal Society of London, Series B (Suppl.)*, 270, S93–95. (DOI 10.1098/rsbl.2003.0023):
- SECOND, P. and JOURARD, S. M. (1956): Mother-concepts and judgments of young women's faces. *Journal of Abnormal and Social Psychology*, 52, 246–250.
- STREISSGUTH, A. P., HERMAN, C. S. and SMITH, D. W. (1978): Intelligence, behavior and dysmorphogenesis in the fetal alcohol syndrome: A report on 20 patients. *The Journal of Pediatrics*, 92, 363–67.
- TODD, J. T., MARK, L. S., SHAW, R. E. and PITTENGER, J. B. (1980): The perception of human growth. *Scientific American*, 24, 106–14.
- THORNHILL, R. and GANGESTAD, S. W. (1993): Human facial beauty: Averageness, symmetry and parasite resistance. *Human Nature*, 4, 237–269.
- THORNHILL, R. and GANGESTAD, S. W. (1999): Facial attractiveness. *Trends in Cognitive Sciences*, 3, 452–460.
- THORNHILL, T. and MØLLER, A. P. (1997): Developmental stability, disease and medicine. *Biological Reviews*, 72, 497–548.
- WALDROP, M. F. and HALVERSON, C. F. (1972): Minor physical anomalies: Their incidence and relation to behavior in a normal and a deviant sample. In R. C. Smart and M. S. Smart (eds): *Readings in Child Development and Relationships*. New York: Macmillan, 146–155.
- ZEBROWITZ, L. A. (1990): *Social Perception*. Buckingham, England: Open University Press.

- ZEBROWITZ, L. A. (1996): Physical appearance as a basis of stereotyping. In N. MacRae, M. Hewstone and C. Stangor (eds): *Foundations of Stereotypes and Stereotyping*. New York: Guilford Press, 79–120.
- ZEBROWITZ, L. A. (1997): *Reading Faces: Window to the Soul?* Boulder, CO: Westview Press.
- ZEBROWITZ, L. A., BROWNLOW, S. A. and OLSON, K. (1992): Baby talk to the babyfaced. *Journal of Nonverbal Behavior*, 16, 143–158.
- ZEBROWITZ, L. A. and COLLINS, M. A. (1997): Accurate social perception at zero acquaintance: The affordances of a Gibsonian approach. *Personality and Social Psychology Review*, 1, 204–223.
- ZEBROWITZ, L. A. and FELLOUS, J. M. (June, 2001): *Trait Impressions of Neutral Expression Faces Predicted from Connectionist Modeling of Facial Metric Information from Angry and Happy Faces*. Poster presented at the conference “Feelings and Emotions: The Amsterdam Symposium”, University of Amsterdam, the Netherlands, June 13–16, 2001.
- ZEBROWITZ, L. A. and McDONALD, S. (1991): The impact of litigants’ babyfacedness and attractiveness on adjudications in small claims courts. *Law and Human Behavior*, 15, 603–623.
- ZEBROWITZ, L. A. and RHODES, G. (2002): Nature let a hundred flowers bloom: The multiple ways and wherefores of attractiveness. In G. Rhodes and L. A. Zebrowitz (eds): *Facial Attractiveness: Evolutionary, Cognitive and Social Perspectives*. Westport, CT: Ablex, 261–293.
- ZEBROWITZ, L. A. and RHODES, G. (in press): Sensitivity to ‘bad genes’ and the anomalous face overgeneralization effect: Accuracy, cue validity and cue utilization in judging intelligence and health. *Journal of Nonverbal Behavior*.
- ZEBROWITZ, L. A., COLLINS, M. A. and DUTTA, R. (1998): Appearance and personality across the lifespan. *Personality and Social Psychology Bulletin*, 24, 736–49.
- ZEBROWITZ, L. A., KENDALL-TACKETT, K. and FAFEL, J. (1991): The influence of children’s facial maturity on parental expectations and punishments. *Journal of Experimental Child Psychology*, 52, 221–238.
- ZEBROWITZ, L. A., MONTEPARE, J. M. and LEE, H. K. (1993): They don’t all look alike: Individuated impressions of other racial groups. *Journal of Personality and Social Psychology*, 65, 85–101.
- ZEBROWITZ, L. A., OLSON, K. and HOFFMAN, K. (1993): Stability of babyfacedness and attractiveness across the lifespan. *Journal of Personality and Social Psychology*, 64, 453–466.
- ZEBROWITZ, L. A., TENENBAUM, D. R., and GOLDSTEIN, L. H. (1991): The impact of job applicants’ facial maturity, sex, and academic achievement on hiring recommendations. *Journal of Applied Social Psychology*, 21, 525–548.
- ZEBROWITZ, L. A., HALL, J. A., MURPHY, N. A. and RHODES, G. (2002): Looking smart and looking good: Facial cues to intelligence and their origins. *Personality and Social Psychology Bulletin*, 28, 238–249.
- ZEBROWITZ, L. A., FELLOUS, J. M., MIGNAULT, A. and ANDREOLETTI, C. (2003): Trait Impressions as Overgeneralized Responses to Adaptively Significant Facial Qualities: Evidence from Connectionist Modeling. *Personality and Social Psychology Review*, 7, 194–215.