MIND, BRAIN, AND EDUCATION

Consumers Favor "Right Brain" Training: The Dangerous Lure of Neuromarketing

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ABSTRACT— Over the past decade the *neuro*marketing of educational products has become increasingly common. Researchers have however expressed concern about the misapplication of neuroscience to education marketing, fearing that consumers may be deceived into investing in apparently "brain-based" products under the misapprehension that they will be more effective. This study provides the first demonstration that these fears are justified. We presented 180 participants with one of four advertisements for an identical educational program, named either "Right Brain" or "Right Start" Training; the advertisements either did, or did not, include an MRI brain image in one corner. Results demonstrated that "Right Brain" training was deemed more interesting, educationally valuable, and scientifically strong than an identical product named "Right Start" training. Advertisements including an unrelated brain image enhanced ratings of scientific rationale. These results confirm that by implying a strong scientific basis, "brain-based" product names are remarkably effective in implicitly manipulating consumer opinion.

Preschool tutoring products that purport to accelerate child development constitute a multibillion dollar industry (Hirsh-Pasek, Golinkoff, Berk, & Singer, 2009). *Neuro*marketing of these educational products is increasingly common, with explanations "based" on neuroscience bolstering a staggering number of product launches each year (Googling "Right Brain Training" yields over 250,000 hits!). Many researchers have expressed concern over the misleading application of neuroscience research to these educational programs (e.g., Beck, 2010; Lindell & Kidd, 2011), fearing that such explanations appear unduly compelling as they imply a sound scientific basis. While there's no question that neuroscientific knowledge has the potential to make a significant contribution to educational design, at present there is a striking gap between neuroscience and education (Blakemore & Frith, 2005; Devonshire & Dommett, 2010), and scientific support for "brain-based" programs is notably absent (Goswami, 2006). Thus parents or schools seeking to give children the best possible start may be deceived into investing in the apparently "brain-based" product under the misapprehension that it will be more effective.

Research in other realms confirms that neuroscience content enhances perceptions of scientific merit, even when that content is irrelevant. Weisberg, Keil, Goodstein, Rawson, and Gray (2008) demonstrated that providing neuroscientific information rendered scientific explanations of psychological phenomena more satisfying, with lay perceptions significantly swayed by the inclusion of logically irrelevant, empirically uninformative neuroscientific information. Importantly, experts were immune to these influences. Weisberg et al. suggest that the presence of neurocontent encourages lay people to believe that they have received a scientific explanation, even when that is not the case. The fact that these data indicate that lay people uncritically accept explanations that include neuroscientific content has profound implications for the neuromarketing of educational products.

In a similar vein, McCabe and Castel (2008) demonstrated that the inclusion of a brain image in a scientific article enhances perceptions of scientific rationale. An article accompanied by an image of a brain prompted higher ratings of scientific reasoning than the identical article accompanied by no image, a bar graph, or a topographic map of brain activation. Akin to Weisberg et al. (2008), these data indicate that neurocontent has a profound influence on judgments of scientific credibility.

This "dazzle effect" (Keehner & Fischer, 2011) has profound ramifications beyond the public perception of science. On the

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basis of the logical belief that the brain supports cognitive and behavioral processes such as learning and memory, consumers are intrigued by educational products that claim to be "brain-based" (Sylvan & Christodoulou, 2010). Thus the inclusion of neuroscientific content in the marketing of an educational program may sway consumer opinion, based on the presumption that the product's claims have a sound scientific basis. Yet unfortunately, most "brain-based" educational programs lack any grounding in brain or cognitive science, and are instead based on scientifically inaccurate myths (Fischer, 2009). Indeed, as Fischer and Immordino-Yang (2008) quip, "The only way that brains are involved in most brain-based education is that the students have brains" (p. xviii). However, as consumers and educators are ill-equipped to critically evaluate "brain-based" claims, they may be dazzled into purchasing a neuromarketed product, despite the absence of scientific support.

Parents have a vested interest in their children's well-being, and are particularly invested in their child's educational progress (e.g., Hoover-Dempsey & Sandler, 1997). In their desire to maximize their child's academic potential, one might anticipate that parents may be particularly vulnerable to the claims of neuromarketed educational products. Consequently, it is vital that parents are made conscious of their susceptibility to "brain-based" claims and critically evaluate the scientific basis of "brain-based" products. Unfortunately, however, research indicates that lay people are ill-equipped to evaluate scientific explanation (e.g., Weisberg et al., 2008), potentially rendering parents particularly vulnerable to the allure of pseudoscientific education programs (Goswami, 2006).

Although research has confirmed that neuroscience content renders scientific reasoning (McCabe & Castel, 2008) and explanation (Weisberg et al., 2008) more satisfying in research papers and scientific articles, research has not examined whether neurocontent influences lay people's perceptions of educational products. If, as warned (e.g., Beck, 2010), "brain-based" content is dangerously alluring, simply using the word "brain" in the name (or an image of a brain in the advertising) of a product will enhance consumer perceptions. In the study reported here, we compared participants' responses to one of four advertisements for a hypothetical educational program. The program was named either "Right Brain Training" or "Right Start Training," and the advertisement either did, or did not, include an unrelated MRI sagittal brain image in the top right-hand corner. All other written and pictorial content was identical. We predicted that participants would judge "Right Brain Training," and advertisements accompanied by a brain image, as more interesting, educationally valuable, and scientifically strong, than an identical program named "Right Start Training," and advertisements without a brain image. Such findings would confirm that irrelevant neurocontent implicitly manipulates consumers into believing that a product has a sound scientific basis, artificially enhancing their perception of that product. To tease apart the influences of parental status and background knowledge on susceptibility to "brain-based" claims, we compared responses for three groups of participants: parents, nonparents (psychology students), and nonparents (nonpsychology students).

METHOD

Participants

Sixty psychology students (mean age = 19.53 years, $SD = 1.32$, 54 females), 60 nonpsychology students (mean age = 21.27 years, $SD = 2.54$, 33 females), and 60 parents (mean age = 41.63 years, $SD = 14.83$, 37 females), were recruited from a medium-size city in Northern England, UK (total $N = 180$). The nonpsychology students were studying a range of subjects at the same university as the psychology students. The parent group was significantly older than the student groups ($p < .001$), who did not differ in age ($p = .833$).

MATERIALS

The stimulus set consisted of a series four advertisements for a hypothetical educational product, in a 2 (Language) × 2 (Graphic) design. The advertised product was either called "Right Brain" or "Right Start" training, and the advertisement either contained or did not contain a saggital MRI brain image in the top right hand corner. All other written and pictorial content in the advertisement was identical across the four versions (copies of the advertisements are available from the researchers upon request).

Participants were required to answer three questions that probed (1) their interest in the product (*I would be interested in more information about the product*), (2) the perceived effectiveness of the product (*Enrolling in the product would enhance my child's intelligence*), and (3) the scientific rationale of the product (*The scientific rationale for the training program is strong*). Each question was rated on a 6-point Likert scale, from *strongly disagree* (1) to *strongly agree* (6). For half of the participants the Likert scale was reversed.

Procedure

Participants were randomly allocated one of four full-color versions of the advertisement: the product was either called "Right Brain" or "Right Start" training, and the advertisement did or did not contain an irrelevant MRI brain image in the top right hand corner. The participants were instructed to read the advertisement thoroughly at their own pace, and then answer the three questions, indicating their responses to questions assessing (1) interest, (2) effectiveness, and (3) scientific rationale, using the Likert scales provided.

Table 1
Mean (*SD*) Ratings of Perceived Interest, Effectiveness, and Scientific Rationale as a Function of (a) Language (Right Brain Versus Right Start) and Group (Psychology Students, NonPsychology Students, Parents), and (b) Image (Brain Versus No Brain) and Group

(a)	*Interest*		*Effectiveness*		*Scientific merit*	
	Right Brain	*Right Start*	*Right Brain*	*Right Start*	*Right Brain*	*Right Start*
Psychology students	4.97 (*0.56*)	4.2 (*0.96*)	4.6 (*0.86*)	4.17 (*1.12*)	3.83 (*1.02*)	3.27 (*0.94*)
Nonpsychology students	4.6 (*1.35*)	4.53 (*1.41*)	5.03 (*1.03*)	4.7 (*1.06*)	4.73 (*1.20*)	4.33 (*1.06*)
Parents	5.23 (*0.73*)	4.7 (*1.32*)	5.33 (*0.84*)	4.93 (*0.78*)	4.93 (*0.83*)	4.73 (*1.01*)
(b)	*Interest*		*Effectiveness*		*Scientific merit*	
	Brain Image	*No Brain Image*	*Brain Image*	*No Brain Image*	*Brain Image*	*No Brain Image*
Psychology students	4.57 (*0.94*)	4.6 (*0.81*)	4.23 (*1.07*)	4.53 (*0.94*)	3.5 (*1.07*)	3.6 (*0.97*)
Nonpsychology students	4.73 (*1.04*)	4.4 (*1.63*)	5.0 (*0.79*)	4.73 (*1.26*)	4.87 (*0.94*)	4.2 (*1.24*)
Parents	5.1 (*0.88*)	4.83 (*1.26*)	5.16 (*0.92*)	5.1 (*0.76*)	5.0 (*1.02*)	4.67 (*0.80*)

Where participants did not have a child they were asked to imagine that they were evaluating the product for a hypothetical child or a child that they knew. Where parents had children that would be too old for the program (e.g., teenagers or adult), they were instructed to imagine that they were evaluating the program for a younger version of their child or, in some cases, their grandchildren. Once participants had made and recorded their evaluations, the assessment was complete and participants were thoroughly debriefed.

RESULTS

The means and standard deviations of participants' responses to the three questions across each condition are shown in Table 1. The three dependent measures were moderately positively correlated ($0.35 < rs < 0.59$). As such, a 2 (Language: Right Brain, Right Start) × 2 (Graphic: Brain Image, No Image) × 3 (Group: Psychology students, Nonpsychology students, Parents) Multivariate Analysis of Variance (MANOVA) was conducted to investigate the influence of these IVs on product ratings. The main effects of Language ($F(3,166) = 3.89$, $p = .01$, $\eta_p^2 = 0.066$) and Group ($F(6, 334) = 8.49$, $p < .001$, $\eta_p^2 = 0.132$) were significant; the main effect for Graphic did not reach significance ($F(3, 166) = 2.11$, $p = .101$, $\eta_p^2 = 0.037$). None of the interactions were significant (all Fs < 1, all ps > .5).

Three 2 (Language: Right Brain, Right Start) × 2 (Graphic: Brain Image, No Image) × 3 (Group: Psychology students, Nonpsychology students, Parents) Univariate Analysis of Variances (ANOVAs) were conducted to investigate the source of these effects. We discuss the analysis of each question in turn.

Interest

"Right Brain" training ($M = 4.93$, $SD = 0.97$) piqued participants' interest more than "Right Start" training ($M = 4.48$, $SD = 1.25$), $F(1,168) = 7.68$, $p = .006$, $\eta_p^2 = 0.044$, with parents showing a nonsignificant trend toward rating advertisements more favorably than psychology or nonpsychology students, $F(2, 168) = 2.53$, $p = .083$, $\eta_p^2 = 0.029$. Where not specifically mentioned, all other main effects and interactions were nonsignificant ($p > .1$).

Effectiveness

"Right Brain" training ($M = 4.99$, $SD = 0.95$) was deemed more likely to enhance children's intelligence than "Right Start" training ($M = 4.60$, $SD = 1.04$), $F(1, 168) = 7.4$, $p = .007$, $\eta_p^2 = 0.042$. Psychology students assessed the likelihood of the product improving children's intelligence as significantly lower than either parents or nonpsychology students, $F(2, 168) = 9.42$, $p < .001$, $\eta_p^2 = 0.101$, who did not differ ($p = .389$).

Scientific Rationale

"Right Brain" training was judged to have greater scientific merit ($M = 4.5$, $SD = 1.12$) than "Right Start" training ($M = 4.11$, $SD = 1.18$), $F(1, 168) = 6.70$, $p = .010$, $\eta_p^2 = 0.038$. Additionally, including a Brain Image ($M = 4.46$, $SD = 1.21$) similarly enhanced perceived scientific merit compared to advertisements with No Image ($M = 4.16$, $SD = 1.1$), $F(1, 168) = 3.99$, $p = .047$, $\eta_p^2 = 0.023$. Finally, psychology students rated scientific rationale significantly lower than either parents or nonpsychology students, $F(2,168) = 26.62$, $p < .001$, $\eta_p^2 = 0.241$, who did not differ ($p = .315$).

DISCUSSION

As predicted, these results demonstrate the allure of neuroscientific content for both vested (i.e., parent) and nonvested (i.e., nonparent) consumers. Changing just one word in the name of the training program had a profoundly

positive influence, with "Right Brain" training deemed more interesting, educationally valuable, and scientifically strong than an identical product named "Right Start" training. The presence of a brain image only enhanced ratings of scientific rationale, suggesting that scientific cachet is implicitly improved with their presence (see McCabe & Castel, 2008). Encouragingly, the effects were less pronounced for psychology students, yet, despite their relative skepticism, even they were persuaded by neurocontent. Given that the advertisements were identical in all other respects, this is the first demonstration that, as researchers warned (e.g., Beck, 2010; Lindell & Kidd, 2011), the use of "brain-based" names is remarkably effective in manipulating consumer opinion in marketers' favor.

The fact that the change of a single word, from "Right Start" to "Right Brain" training, had such a positive influence on perceptions of scientific merit is consistent with past research (e.g., Weisberg et al., 2008). However, the fact that including the word "brain" in the name of the product also rendered the product more interesting and more educationally effective has not previously been demonstrated. This finding indicates that, within a marketing context, the enhanced scientific credibility engendered by the neuroscience content has a halo effect, leading to greater interest in the product, and greater faith in the effectiveness of that product. Little wonder the number of "brain-based" educational tools appears to be growing exponentially despite the dearth of scientific support (Goswami, 2006).

McCabe and Castel (2008) have previously reported that the presence of a brain image enhances ratings of scientific reasoning for research articles. In the present investigation, the inclusion of a brain image in the advertisement for the product similarly enhanced perceived scientific rationale, confirming that scientific cachet is implicitly improved by such neurocontent. The data therefore suggest that scientifically derived visual neurocontent can provide added value to any verbal claims made about products, but that this value is limited to assessments of the scientific basis of the product itself. In recent years the popular press has become replete with brain images accompanying a diverse range of pieces, ranging from popular reports on scientific research to car advertisements. Given that such images are freely available in the Internet and that the general public hold fairly naïve ideas about brain–behavior relationships, it is unfortunate but not surprising that brain images are being used for marketing purposes.

All participant groups deemed "Right Brain" training to be more interesting, effective, and scientifically strong than "Right Start" training. It is important to note, however, that psychology students were more skeptical than either parents or nonparents who had not studied psychology. Given that the parent and the two nonparent groups (psychology students and nonpsychology students) were not well-matched, this finding is important as it demonstrates that the observed effect is not simply attributable to differences in group age; psychology and nonpsychology student groups did not differ in age and yet the former were less susceptible to neurocontent than the latter. While it is encouraging to see that psychological training enhances critical evaluation of neuromarketed products, the fact that the vast majority of consumers lack such training indicates that any prophylactic effect of psychological study is limited in its applicability. Importantly, both vested (i.e., parent) and nonvested (i.e., nonparent) consumers were equally influenced by neuroscience content, countering the suggestion that parents' interest in promoting the best academic outcomes for their child may render them especially vulnerable: whether vested or nonvested, consumer opinion is favorably swayed by irrelevant, unsupported neurocontent.

Educators and parents are, not surprisingly, motivated to seek products that will elicit the best academic outcomes for children: every educator seeks to positively influence the learning child's brain (Lindell & Kidd, 2011). Unfortunately, lay consumers are ill-equipped to evaluate the scientific claims made by "brain-based" products. As we have shown, this renders consumers acutely vulnerable to neuromarketing campaigns: we favor "Right Brain" training in a flawed attempt to give children the "Right Start."

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