Pink knights for all? Perception, categorization and preferences for toys

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Abstract:

This paper examines the effects of theme and color of toys, testimonials and the sex of children on visual attention, gender classification and play preferences. As part of an experiment with 74 four- and five-year-old children, an eye-tracking study was combined with a child-friendly interview. Two LEGO® DUPLO® models, which were systematically modified, served as the basis. The study demonstrates that classic design and advertising elements influence visual attention, gender attribution and play preferences. In general, the more a toy matches the biological sex of a child, the stronger the play preferences will be. This applies similarly to visual preferences. From a marketing point of view it is preferable to link products with a gender. From a societal point of view this can reinforce stereotypes. In addition, the study also reveals that even small changes in design and advertising elements give children more flexibility in their decision-making behavior.

Keywords: Gender Marketing, Visual Attention, Toys Choice

Track: Consumer Behavior

1. Introduction

Companies may use gender as a segmentation criterion to identify market segments with similar requirements, and to meet these through gender-specific marketing. Moreover, companies can better exploit the market potential by adapting their products to the female or male target group, more specifically by assigning a gender to them (Cowart & Darke, 2014). Through the use of various product features the products are given a product-specific identity. Studies demonstrate that gender-specific products are still widespread despite the fact that western societies attempt to break through the image of classical gender roles (Fugate & Phillips, 2010). Toy manufacturers also engage in gender marketing and provide toys with a male or female identity by using various design elements. These include key signals such as theme, color (Nelson, 2005), shape and surface structure (van Tilburg, Lieven, Herrmann & Townsend, 2015). In addition, advertisers tend to reflect the typical peer group (Debevec & Iyer, 1986; Eisend, 2010). The result is that girl-specific products are often characterized by the color pink, primarily in pastel shades. In the case of boy-specific products blue dominates and a more intensive coloring is observed (Auster & Mansbach, 2012). While boys tend to have toys that reflect public life, e.g. construction machinery or other work equipment needed for the non-residential workspace, girls are much more inclined to play with toys that represent the private sphere of life and imitate household objects (Nelson, 2005).

In this study, we examine the influence of gender-stereotypical design features and advertising elements on the visual preference of children aged 4-5, their gender attribution, and their play preferences for toys using LEGO® DUPLO® as an example. For this reason, we designed an experimental eye-tracking study and combined it with a child-friendly interview.

2. Objectives

The aim of the study is to analyze the influence of the elements theme, color and advertiser at two different LEGO® DUPLO® models on the visual preference, the assignment to a gender and the play preferences of children. The following questions are to be answered:

a) Do gender-appropriate themes and colors receive more visual attention?

b) What is the effect of theme, color and advertiser on visual preferences?

c) What is the influence of theme, color and advertiser on the attribution of children to one gender and the willingness to play with various toys?

3. Methods

An experimental study was carried out to answer the questions. LEGO® DUPLO® was chosen as a demonstration object since these toys have both boys and girls as target groups. A knight's castle was used as a typical product for boys due to its connotation to adventure and action. A house was used as a typical product for girls as it is associated with social aspects such as caring and interpersonal interaction at home (Blakemore & Centers, 2005; Cherney & Dempsey, 2010). The colors blue and pink were selected as boy-typical and girl-typical colors respectively.

A girl and a boy corresponding to the peer group were selected as advertising persons. During a professional photo session, both original toys were photographed separately. At first, the advertisers were photographed separately while playing with the original toy. Thereafter, they were photographed while playing together either with the castle or the house. Subsequently, the colors of the toys were then systematically manipulated with image processing software (e.g. original: pink house, manipulated: blue house), in a way that all together 16 different stimuli have been generated.

In order to examine the visual attention of the children, an experimental eye-tracking study with the stationary eye-tracking system "Tobii X60 - 60 Hz" was performed. The display of the models was based on a systematic comparison, e.g. sex-congruently models vs. sex-incongruently models, and presented in 34 different pairs to the children - each for six seconds. The presentation of each picture on the left or right was randomized and constant for all pairs, while the order of presentation was randomized by the eye-tracking software.

A child-friendly interview with the support of a trained nursery teacher followed. The 16 LEGO® DUPLO® pictures were shown to the children randomly as individually printed pictures. The children were asked to categorize each toy as either a "girl toy", a "boy toy" or a "boy and girl toy". In order to determine their preferences for each of the 16 models, the children were asked: "Would you like to play with the toy?" Therefore a 5-point Likert scale was applied using smileys from very happy to very sad. The design of the study was successfully validated with the help of a pretest. All together 74 four and five year old children participated in this study

4. Main Results

The combination of the eye-tracking method with the child-friendly interview was successfully implemented together with all children. Due to incomplete eye-recordings,

insufficient calibration or termination of the interview, the data from four participants had to be deleted. This resulted in a final number of 70 subjects, 35 girls and 35 boys. The average age of the children was 4.4 years.

4.1 Visual preferences

Each toy was defined as an area of interest (AOI) and visual attention was measured by the total fixation duration (TFD) in the AOI. In order to examine the visual preferences of children for sex-congruent themes and sex-congruent colors, composite scores were formed by looking at the average TFD of the house versus the castle (20 pairs of stimuli), regardless of color or sex of advertiser, across all stimuli. Visual preferences for sex-typed colors were evaluated by calculating composite scores of the average TFD for viewing pink versus blue (18 pairs of stimuli) across all stimuli, regardless of theme or sex of advertiser. A comparison between the sexes (Tab. 1) reveals that the girls fixate the house significantly longer ($M = 46.56$, $SD = 9.54$, $n = 35$) than the boys ($M = 34.87$, $SD = 9.24$, $n = 35$), $t(68) = 5.207$, $p < .001$. A similar pattern can be seen in the visual preferences for the color pink, which is significantly longer for the girls ($M = 42.68$, $SD = 8.19$, $n = 35$) than for the boys ($M = 35.50$, $SD = 9.66$, $n = 35$), $t(68) = 3.355$, $p = .001$. Boys look at the castle insignificantly longer than girls. Visual preferences for the color blue are almost equally distributed.

	Girls *M s (SD)*	Boys *M s (SD)*	t-test *p (between sexes)*
20 pairings comparing house to knight's castle combined across all stimuli pairs			
House	46.56 (9.54)	34.87 (9.24)	.000***
Knight`s castle	46.05 (11.44)	48.27 (14.46)	.478
p (within sexes)	.854	.000***	
18 Pairings comparing pink to blue combined across all stimuli pairs			
Pink	42.68 (8.19)	35.50 (9.66)	.001
Blue	38.57 (8.17)	38.46 (11.19)	.963
p (within sexes)	.024	.222	

Table 1. The mean total fixation duration of composite scores by sex
***p < .001

The composite score was also used to examine the preferences of children within their own gender group. As displayed in Table 1, the boys clearly show visual preferences for the castle versus the house, $t(34) = -4.831$, $p < .001$ and prefer blue to pink. The difference in color preferences is not significant. However, significant difference, $t(34) = 2.357$, $p = .024$, can be observed for the girls and their visual preferences for pink versus blue. With regard to the fixation of the house versus the castle, there is hardly any difference among the girls. The age of the children does not play a role for the visual preferences within all comparisons.

In order to determine the effect of topic, color and advertiser on visual preferences, all stimuli where viewed separately: 1) without an advertiser (block I), 2) with an advertiser (block II) and 3) with both advertisers (block III). This was done in order avoid a falsification of the results due to a systematic comparison of different numbers of stimuli and slightly different AOI sizes between the blocks. Table 2 displays the summarized results.

	Block I: Theme & Color[a]		Block II: Theme & Color & One Ad Person[b]		Block III: Theme & Color & Both Ad Persons[c]	
	Girls *M s (SD)*	Boys *M s (SD)*	Girls *M s (SD)*	Boys *M s (SD)*	Girls *M s (SD)*	Boys *M s (SD)*
House	6.19 (2.16)	4.85 (2.12)	11.85 (3.28)	9.69 (3.05)	7.21 (2.78)	6.14 (2.53)
Castle	6.69 (2.53)	6.89 (2.85)	11.52 (3.70)	11.75 (3.85)	6.41 (2.22)	6.21 (2.71)
Pink	6.59 (2.53)	5.93 (2.97)	11.96 (3.12)	10.58 (3.52)	7.01 (2.88)	6.08 (2.64)
Blue	6.29 (2.18)	5.82 (2.43)	11.41 (3.82)	10.87 (3.71)	6.61 (2.15)	6.27 (2.60)
Ad Girl	-	-	11.92 (3.62)	10.41 (3.80)	-	-
Ad Boy	-	-	11.45 (3.36)	11.03 (3.40)	-	-

Table 2. The mean total fixation duration depending on theme, color and advertising person
The mean values result from a previously summed TFD of the same model.
Each variation occurs three times in block I and III, and five times in block II.
[a] N=280, four different models [b] N =560, eight different models [c] N =280, eight different models, with N =70 participants × number of model variations.

The evaluation of the TFD in block I results in: girls look at pictures with the castle (6.59s) longer than at pictures with the house (6.19s). Furthermore, they stay longer on pink toys (6.59s) than on blue ones (6.29s). The boys look at the castle (6.89s) much longer than at the house (4.85s). There is hardly any difference in remaining time between the two colors.

To assess the effects of sex, theme and color on the visual preferences, we conducted a 2 x 2 x 2 analyses of variance (ANOVA). It proves that the overall model to be significant ($F(7,272) = 5{,}819$, $p < .001$, adjusted $R^2 = .108$, $N = 280$). Moreover, the theme has clearly a significant influence on gaze behavior ($F(1, 272) = 19{,}429$, $p < .001$, $\eta_p^2 = .067$). The same applies to sex ($F(1, 272) = 3{,}910$, $p < .049$, $\eta_p^2 = .014$). The color itself does not have a significant relationship with the TFD. Furthermore, the interaction of theme and color as well as the interaction of sex and theme have a significant effect on visual preferences. The main effect of the theme therefore partially depends on sex ($F(1,272) = 7.175$, $p = .007$, $\eta_p^2 = .026$) and on color ($F(1,272) = 9.184$, $p = .003$, $\eta_p^2 = .033$). According to Cohen (1992), the strength of the main effect "theme" ($f = 0.26$) is to be classified medium and for "sex" ($f = 0.11$) weak. This also applies to the effects of the interactions of theme and color ($f = 0.18$) as well as for sex and theme ($f = 0.16$).

If an advertiser (block II) presents the models, both sexes fix models with the sex-congruent themes, colors or advertiser longer. This is particularly noticeable among the boys, who look at the castle with an average of 11.75s for much longer than at the house with 9.69s.

The overall model is also significant for the 2 (sex) × 2 (theme) × 2 (color) × 2 (advertiser) analyses of variance (ANOVA) ($F(15,544) = 4{,}077$, $p < .001$, adjusted $R^2 = .076$, $N = 560$). The analysis reveals again that both the sex of the subject ($F(1,544) = 10.933$, $p = .001$, $\eta_p^2 = .020$) and the theme have a significant influence on the gazing behavior ($F(1,544) = 8.827$, $p = .003$, $\eta_p^2 = .016$). Color and advertiser exclusively have no significant effect. In addition, the interaction of theme and sex as well as the interaction of theme and advertiser have a significant effect on the gazing time. Hence, the main effect of the theme depends on the sex of the children ($F(1,544) = 16{,}901$, $p < .001$ $\eta_p^2 = .030$) and on the advertiser ($F(1,544) = 9{,}977$, $p = .002$, $\eta_p^2 = .018$). According to Cohen (1992), the strength of the main effects theme ($f = 0.13$) and for sex ($f = 0.14$) may be classified as weak. The same applies for effects of the interactions between theme and sex ($f = 0.18$) as well as between theme and advertiser ($f = 0.14$).

Within the last block (III) the original and manipulated toys from the first block of the eye-tracking study are shown with both advertisers. Here, the girls look longer at the house (7.21s) than at the castle (6.41s). Furthermore, they remain longer with pink toys (7.0s) than with blue ones (6.61s). In addition, they look at the pink house (7.58s) much longer than at 1) the blue house (6.83s), 2) the pink castle (6.43s) and 3) the blue castle (6.39s).[1] Among boys both theme and color only trigger slight differences in fixation duration. Boys look at blue toys (6.27s) slightly longer than at pink ones (6.08s). Moreover, they look at the castle slightly longer (6.21s) than the house (6.14s). In relation to the individual constellations they consider the blue castle (6.48s) longer than 1) the pink castle (5.94s), 2) the blue house (6.06s) and 3) the pink house (6.22s).[1]

In order to measure the effects of the variables an ANOVA (2 × 2 × 2) was also performed here. The overall model is not significant ($F(7,272) = 1.421$, $p = .197$, adjusted $R^2 = .035$, $N = 280$). Merely the variable sex has a significant influence on the fixation duration ($F(1,272) = 4.252$, $p = .040$, $\eta_p^2 = .015$), with a weak effect according to Cohen (1992) ($f = 0.12$). Neither the other variables nor their interactions have a significant effect. Since the stimulus pairings are the same as in the first block of the study, which were only

[1] Not reported in Table 2.

supplemented by both ad persons, it can be concluded from this that the advertising persons attenuate the main effects, which became clear without them.

4.2 Gender Classification of LEGO® DUPLO® Models and Preferences to Play

In order to verify whether the gender identity attributed to a toy depends on the color, theme and advertisers, the children were asked to categorize each toy as either a "girl toy", a "boy toy" or a "boy and girl toy". The results of this survey are summarized in Table 3.

	Pink			Blue		
	All	Girls	Boys	All	Girls	Boys
	M (SD)	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*
House	1.45 (0.53)	1.48 (0.57)	1.41 (0.50)	2.09 (0.80)	1.97 (0.78)	2.21 (0.81)
Castle	1.72 (0.80)	1.68 (0.73)	1.77 (0.88)	2.88 (0.36)	2.82 (0.39)	2.94 (0.24)
House – Girl	1.40 (0.52)	1.35 (0.49)	1.45 (0.56)	1.89 (0.75)	1.85 (0.71)	1.94 (0.79)
Castle – Girl	1.49 (0.69)	1.47 (0.62)	1.52 (0.76)	2.30 (0.76)	2.24 (0.82)	2.38 (0.71)
House – Boy	1.79 (0.73)	1.74 (0.75)	1.85 (0.71)	2.36 (0.69)	2.27 (0.76)	2.45 (0.62)
Castle – Boy	1.90 (0.81)	1.85 (0.78)	1.94 (0.85)	2.65 (0.57)	2.58 (0.61)	2.72 (0.52)
House – Both	1.76 (0.43)	1.73 (0.45)	1.79 (0.42)	2.12 (0.53)	2.09 (0.58)	2.15 (0.44)
Castle – Both	1.78 (0.57)	1.71 (0.52)	1.85 (0.62)	2.50 (0.53)	2.59 (0.50)	2.41 (0.56)

Table 3. Gender classification of LEGO® DUPLO® models*
*Scale where 1 = only girls, 2 = girls and boys, 3 = only boys

The gender attributions of the models by girls and boys are very similar with no significant mean differences. The children also identified sex-congruently constructed LEGO® DUPLO® models as such. They assign the pink house to girls (M = 1.45, SD = 0.53) and the blue castle to boys (M = 2.88, SD = 0.36). The sex-incongruently constructed models are less clearly assigned to a particular sex. From the children's point of view these models are a "boy and girl toy".

The effect of the advertisers on the attribution of the children is determined by comparing the mean values of the same models with and without the advertiser with the help of the T-test in samples with paired values. There is no differentiation between the sexes due to similar attributions.

If a girl plays with the toys on the pictures, the categorization for almost all models significantly shifts in the direction of a "girl toy", whereby this shift is strongest for the blue castle, which was previously regarded as "boy toy". Only the pink house, which had already been regarded as a "girl toy", showed no significant change.

With the exception of the blue castle, the children consider all models with which a boy plays significantly more masculine in comparison to the same models without an advertising person. Among the boys this effect is particularly strong in the case of the pink house.

Originally classified as a "girl toy" the pink house becomes a "boy and girl toy". In the case of the blue castle, which is already labeled as a "boy toy", the male advertiser does not significantly reinforce the effect.

If both children play with the toys on the photographs, the attributions for the sex-incongruent (e.g. pink castle) models remain almost unchanged compared to the models without an advertiser. These models have already been classified as "boy and girl toy", so that the advertisers have no effect. If the sex-congruent models (e.g. blue castle) are shown with children of both sexes playing together, the response behavior of the participants changes significantly. If the pink house or blue castle without advertising person were previously categorized as "girl toy" or "boy toy", they are now seen as "boy and girl toy". This effect is stronger for boys than for girls.

The evaluation of the play preferences results in a similar picture as in gender classification (Tab. 4). The toys that are clearly constructed and classified as gender-specific are also preferred according to the gender. Girls prefer to play with the pink house (M = 1.34, SD = 1.04), boys prefer to play with the blue castle (M = 1.30, SD = 0.85). At the same time these toys are much less popular with the opposite sex. Basically, the more a toy is assigned to one's own sex, the more it is preferred.

	Pink			Blue		
	All *M (SD)*	Girls *M (SD)*	Boys *M (SD)*	All *M (SD)*	Girls *M (SD)*	Boys *M (SD)*
House	2.11 (1.63)	1.34 (1.04)	2.90 (1.76)	2.06 (1.58)	1.91 (1.49)	2.22 (1.68)
Castle	2.16 (1.71)	1.71 (1.38)	2.62 (1.89)	2.31 (1.75)	3.29 (1.85)	1.30 (0.85)
House – Girl	2.23 (1.66)	1.47 (1.08)	3.03 (1.81)	1.92 (1.38)	1.69 (1.26)	2.15 (1.48)
Castle – Girl	2.28 (1.75)	1.61 (1.20)	2.91 (1.96)	1.97 (1.55)	2.61 (1.80)	1.29 (0.82)
House – Boy	1.88 (1.48)	1.44 (1.08)	2.31 (1.69)	1.83 (1.40)	2.09 (1.53)	1.58 (1.23)
Castle – Boy	2.00 (1.56)	1.76 (1.44)	2.24 (1.65)	1.94 (1.59)	2.69 (1.77)	1.19 (0.54)
House – Both	1.76 (1.41)	1.16 (0.76)	2.34 (1.67)	1.63 (1.18)	1.70 (1.24)	1.56 (1.13)
Castle – Both	1.79 (1.34)	1.50 (1.05)	2.09 (1.55)	1.82 (1.39)	2.45 (1.63)	1.24 (0.78)

Table 4. Preferences to play*
*Scale where 1 = very much like to play with, 5 = not at all happy to play with

In order to determine the effects of advertisers on play preferences, mean value comparisons were made with comparable models without advertisers. Due to significant mean value differences, a distinction was made between girls and boys.

If the models are displayed with a female advertiser, this significantly ($p = .09$) increases the play preferences of the girls to play with the blue castle at a level of significance $\alpha = 0.1$, while their play preferences for the blue house ($p = .42$) increase insignificantly. However, their preferences for the other models remain unchanged. In the case of boys, female

advertisers do not elicit significant changes in preferences. A much stronger effect can be seen when a male advertiser is displayed with the models. In this case, boys have higher playing preferences for the pink ($p = .08$) and the blue house ($p = .09$). The play preferences of the girls are less influenced by the male advertiser.

If the models are depicted with both a girl and a boy advertiser, girls and boys on average prefer to play with all models than with comparable models without an ad person. Although, the increase among boys tends to be stronger. However, only the increase in preference for the blue house with both advertisers in the boys' group proved to be slightly significant ($p = .07$).

5. Implications

In a comparison of sex-congruent to sex-incongruent themes or colors, girls and boys, with a few exceptions, have higher visual preferences for toys that are considered appropriate to their own sex. Theme and sex of participants in themselves have a significant influence on the duration of fixation whether displayed with or without an advertiser. If both a female and a male advertiser play with the LEGO® DUPLO® models, than the effect of the theme on gaze behavior is considerably reduced.

Children identify sex-congruently constructed LEGO® DUPLO® models as such, regardless of their own sex. If only one variable is sex-incongruent, than it tends to be categorized as "boy and girl toy". The use of a female or a male advertiser results in a corresponding shift in the direction of the gender depicted. If the models were previously regarded as "boy and girl toy", the depiction of both advertisers has hardly any influence. In the case of models that were previously classified as "girl toy" or "boy toy", the addition of both advertisers results in children to believe that it is now a "boy and girl toy". The play preferences may be summarized as following: the more a toy matches one's own biological sex, the stronger are the playing preferences.

Our results confirm that it makes sense from a marketing point of view to link products with a gender: the visual preferences in most cases are higher if the theme or the color of toys matches the biological sex. In case of the play preferences this effect is even higher. It can also be counted as positive that the selection process for consumers is simplified and supposed needs might be better satisfied. The continued positive sales figures for LEGO® products specific to girls also illustrate the economic success.

However, from a societal perspective marketing managers must also be aware that this helps to manifest the stereotyping of gender attributions. While sex describes the biological

constitution, gender describes the social and cultural dimensions associated with biological sex (West & Zimmermann, 1991). Toys have an influence on the socialization process of children. It is possible to modify the children's playing preferences by simply modifying the product itself or changing the advertising approach. This may result in more flexibility in their decision-making behavior.

Further studies could, for example, investigate how more neutral themes and colors of toys influence perception and play behavior of children.

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