

Millennial Consumer Behavior with Mobile Technology

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Abstract

This study analyzes how mobile technology and interaction with packaging potentially influence Millennial and Generation Z consumers' drive to purchase goods. The study was conducted in Germany, Czech Republic, Austria, and France in spring of 2018, and in the US during the fall of 2018 at Cal Poly State University in San Luis Obispo, California. Four Hypotheses (H) were explored:

- H1 - Millennials/Generation Z's in the US and Europe prefer interactive packaging vs packaging with no interactivity (i.e. merely printed packaging)
 - Conclusion: In Europe, these consumers did prefer interactive packaging over mere printed packaging, but in the US they did not.
- H2 - Millennials/Generation Z's in the US and Europe prefer Augmented Reality over Quick Response codes
 - Conclusion: In Europe, these consumers did prefer Augmented Reality over Quick Response codes, but in the US they did not.
- H3 - Millennials/Generation Z's in the US and Europe prefer Near Field Communication over Augmented Reality
 - Conclusion: In Europe, these consumers did not prefer Near Field Communication over Augmented reality, but in the US, they did.
- H4 - Millennials/Generation Z's in the US and Europe will purchase packaged products based on their experience of interactivity
 - Conclusion: the data does not support a positive outcome for either geographic region.

These consumers do not think these technologies are sufficient to drive to a purchase, though in Europe, there was higher likelihood of using the technologies in store over the US.

The results of this study will have bearing on Consumer Goods Companies' focus on interactive packaging and the relevancy to drive consumers, specifically Millennials and Generation Z, to a purchase, or experience with the brand.

Disclaimer: This study aimed to answer some specific questions regarding Millennial and Generation Z consumer behavior for a specific product, but the results do not imply that these technologies (QR, NFC, and AR) are not an important part of consumer packaging and consumer engagement. There are many examples of how these technologies can be used to enhance the consumer experience with product instructions, food recipes, product payment, etc.

Introduction

Now, more than ever, brands are vying to capture the attention of the largest population in the US, the Millennials and Generation Z.

Millennials are people born between 1979 and 1994, and thanks to immigration, this demographic has surpassed the US baby boomers in total population in 2010 (Lamb, Hair, McDaniel, p. 55). Millennials are also an interesting demographic as there is a large cohort that are young college students, and “older” Millennials that are in their 30s, starting families and careers. This demographic is targeted to spend USD \$1.4 Trillion by 2020, representing approximately 30 percent of retail sales (Lamb, Hair, McDaniel, p. 55). It is no wonder that they are the target of many significant marketers and brands.

Millennials are well known as “highly educated, career-driven, politically progressive and—despite popular belief—do indeed develop strong brand loyalty when presented with quality products and actively engaged by brands,” (Sandor). One of the most obvious traits of Millennials is their constant interaction with their mobile devices. According to a 2014 Future Foundation of Millennials study, it was found that Millennials check their devices 43 times a day on average (Clifford).

Generation Z was born between 1995 and 2010, and consists of 61 million consumers in the US alone, most of whom have never known a world without social media or smartphone. Generation Z use up to five screens at a time and take a mere eight seconds to determine if something is worth their attention. By 2020 this group will make up 40 percent of working consumers. Generation Z spends about \$44 Billion annually and influence another \$600 Billion in family spending (Lamb, Hair, McDaniel, p. 55).

Packaging is the fastest growing segment of the printing industry, and is poised to continue that growth. According to Smithers Pira, the global printing industry is forecast to reach USD \$980 billion in 2022, driven by growth in packaging and labels, rather than graphic applications. In a separate study, it is estimated that the printed packaging market will be \$587.19 billion by 2020 (marketsandmarkets). There are many reasons for growth in packaging: continued rise in global population, trends in convenience packaging, proliferation of stock keeping units (SKUs), such as flavors or versions of products, etc.

Consumer product companies want to tap into that Millennial and Generation Z behavior of mobile technology use to establish engagement and loyalty. Nestlé, one of the world's largest consumer product companies (CPC) has recently stated, "technology is fundamentally changing the way consumers buy its products and engage with its brands and that is, of course, valid for all and every consumer packaged goods company in the world. As technology is fundamentally changing the way consumers buy products and engage with brands, there is a need to create highly engaging and meaningful experiences online." According to Lydekaityte and Tambo, interactive packaging is capable to further prolong consumer experience, engagement, and entertainment at home while consuming/using the product... interactive packaging builds stronger consumer-brand relationships.

Three common types of interactivity in consumer packaging are Quick Response codes (QR), Augmented Reality (AR), and Near Field Communication (NFC). There are many examples that exist currently with different brands and these technologies, but few references that show an increase in sales of the product, or relationship as a result from Millennials or Generation Zs.

- a. QR codes: Quick Response (QR) codes are bi-dimensional, machine-readable optical labels that were developed in 1994 for fast and accurate inventory checks (Denso, 2011). They are an ISO standard that implies global acceptance. QR codes can link consumers to URLs, SMS, etc. They can be created for free and applied to almost any packaging material. Most smartphones have the ability to either natively read the codes, or can easily open an app specific to QR codes. QR codes can provide consumers more information about a product, most commonly linking them to the company's web page. QR codes have been common in consumer packaging since the early 2000s (Okazaki). Figure 1 illustrates a consumer interacting with the packaging of Ethical Bean coffee. When the consumer scans the code, they are given information about the coffee and how to brew it.



Figure 1: Example of consumer interacting with Ethical Bean coffee packaging with a QR code app (packagingdigest.com)

- b. **Augmented Reality (AR):** AR is technology that seamlessly overlays virtual content over the real world, so that both can be experienced at the same time. According to Billinghurst, AR is a system that has three characteristics: (1) it combines real and virtual content, (2) it is interactive in real time, and (3) it is registered in three dimensions (Sage Encyclopedia of the Internet). AR in consumer packaging can create interesting and engaging experiences between the brand and consumer. In order for the consumer to activate an AR experience, they need to download an app, point their mobile device camera at the package, and experience the view. There are several examples of AR in packaging. Figure 2 illustrates an AR campaign for Walking Dead wines, where the consumer downloads the app, “Living Labels”. Once they download and activate the app, the consumer chooses the brand, and points the camera from their device to the bottle. Each varietal gives a different experience. The consumer will see a video arise from the label accompanied by sound.



Figure 2: Example of consumer interacting with the AR app Living Labels, experiencing the Walking Dead wine (youtube.com)

- c. Near Field Communication (NFC): NFC is a form of contactless communication between devices like smartphones or tablets. Contactless communication allows a user to wave the smartphone over a NFC compatible device to send information without needing to touch the devices together or go through multiple steps setting up a connection (nearfieldcommunication.org). NFC technology is included in packaging in the form of a small chip. This chip is a wireless link that can be activated by another chip, such as in a smartphone. Once the NFC chip in the package is activated by a smartphone chip, tiny amounts of data are then transferred between the two devices, giving the consumer information on the product with the NFC chip. There is no pairing that must be set up first like with Bluetooth, making it simple for the consumer to use without hassle (www.water-io.com/nfc-based-packaging). An example of NFC in packaging is from 2015, when the Diageo brand Johnnie Walker Blue bottle was equipped with an NFC tag. This turns every Johnnie Walker Blue Label bottle into a smart bottle that holds digital information consumers can access with any NFC- enabled smartphone. The tags and the sensors contain information Diageo can use to send personalized communications to consumers (Forbes.com). Figure 3 illustrates how the consumer uses their NFC- enabled smart phone to come into close proximity of the tag (secured to the cap). The consumer does not need to download an app for this exchange to take place, rather ensure that NFC is enabled on their smart device.



Figure 3: Example of consumer using NFC – enabled smartphone with Jonnie Walker NFC tag on bottle (Forbes.com)

Experiment

The study took place in two geographic regions: Europe (with work from students at Munich University of Applied Sciences or MUAS) and the US, specifically California (with work from students at California Polytechnic State University, or Cal Poly).

A fast moving consumer good (fmcg) was chosen that appeal to both Millennials and Generation Z consumers, in both geographic regions. The product for the study is a fictitious energy drink, called “451° Energy”. According to a study by the Mintel group, 64% of Millennials consume energy drinks on a regular basis. Energy drinks are easily shopped for, and easy to pick up, hold and interact with, and also have a strong social media presence; which is another favorite Millennial and Generation Z pastime.

The energy drink graphics were produced on a shrink sleeve such that it could easily mold to a standard sized 375 ml can (similar to canned wine). The graphics were designed by Cal Poly students, and the shrink labels were produced by Multi-Color Global Label Solutions based in Napa, Ca. All technologies that were used for this experiment are commercially available.

Four options of interactivity were applied to the cans:

a. Option one: no interactivity – graphics only (Figure 4). The cans look authentic with nutritional information, and information about the product. No technology is applied for mobile device.

b. Option two: A QR code (Figure 5) that linked to the energy drink web site (Figure 6). The QR code had a flame icon to imply an experience for the consumer. The interactive, responsive web site allowed the subjects to click on different informational aspects of the product, and link to the product's Instagram page. The QR code was generated from Unitag; (<https://www.unitag.io/qrcode>).

c. Option three: An NFC tag (Figure 7) that linked to the same web site specifically to a video showing consumers enjoying the product (Figure 8). The NFC tag was a special tag designed to be applied to cans containing liquid. The tag was applied under the shrink sleeve with graphical instructions to the consumer to tap the can with their device for an experience. The video depicts young people in a mundane environment. The young people consume the energy drink, and they become alive and active. Music is in the video as well. The video is 15 seconds long, as both Millennials and Generation Z do not like to spend too long watching videos. The NFC tags were provided by Qliktag; (<https://www.qliktag.com/>).

d. Option four: An AR experience that called the consumer to interact with the can by tapping on elements that displayed on the phone (Figure 9). The graphics on the can gave instructions to the consumer to scan the image (Figure 10) of the product with the smartphone camera for an interesting experience. The consumer saw the energy drink's power create a hole in the can, where the product leaked out. The AR allowed the consumer to tap the hole to fix it. The study used HP Reveal AR application; (<https://www.hpreveal.com/>).

Though the experiences differ slightly for each technology element, it was decided they were appropriate for what is currently in the market for interactive packaging.

For the sake of time, the same smart device was used with all subjects during the study, and that device had the QR reader, AR app, and NFC pre-loaded. The smart device used was a Motorola MOTO Z Android phone with 4G capability.

Subjects were asked a series of demographic questions (such as age, gender, where they lived, etc), then asked if they would be willing to interact with the different technologies applied to the cans of energy drinks. Note that for the consumers in Europe, the graphics for the shrink sleeves were created in German, and for the US, they were in English.



Figure 4: 451° Energy drink graphics in German and English



Figure 5: 451° Energy drink can with QR code

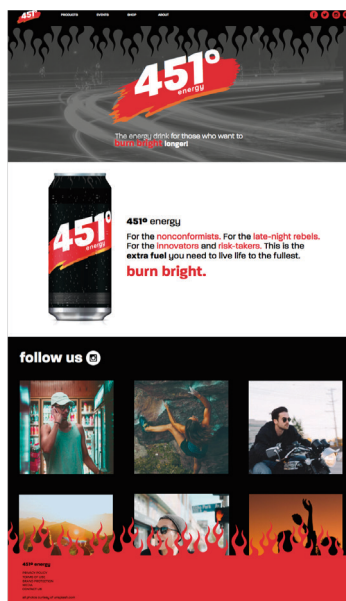


Figure 6: 451° Energy drink responsive web site



Figure 7: 451° Energy drink can with NFC tag ("Tap here for more Energy")



Figure 8: 451° Energy drink link to web site video



Figure 9: 451° Energy drink can with AR ("Scan here for more Energy")



Figure 10: 451° Energy drink can with AR – subject interacting with the experience

The protocol of the experiment was to have all cans of energy drinks set on a table such that consumers could interact with each can separately and conveniently (Figure 11, 12). The order of interactivity presented to subjects was (1) no interactivity, (2) QR code, (3) NFC, and (4) AR. Two students were assigned to each subject – one to assist with the interactivity (handing the consumer the smartphone, and explaining the reason for the study), and one to record the answers to the survey questions, and get anecdotal feedback. The surveys were taken both on college campuses (MUAS and Cal Poly) in addition to city centers of Munich, Regensburg, Prague, Salzburg, Strasbourg (Europe) and San Luis Obispo, CA (US). Subjects were asked to volunteer their time for the study, and were approached randomly. The data was recorded in a Google Doc and exported into Google Sheets. None of the subjects were compensated for their time.



Figure 11: subject holding and interacting with energy drink can while student records data



Figure 12: subject answers demographic questions of survey while student records data

Results and Discussion

A total of 352 subjects were interviewed for this experiment in both regions; 221 in Europe and 131 in the US. In Europe, 52.5% of the subjects were male, and 47.1% were female (one preferred not to state gender). In the US, 28.2% of the subjects were male, and 71% were female (one preferred not to state).

The age demographics were broader in Europe, with subjects ranging in age from ~ 16–30. In the US, the ages were narrower, ranging in age from ~18-25. (Figures 13, 14).

Breakdown of Age (Europe)

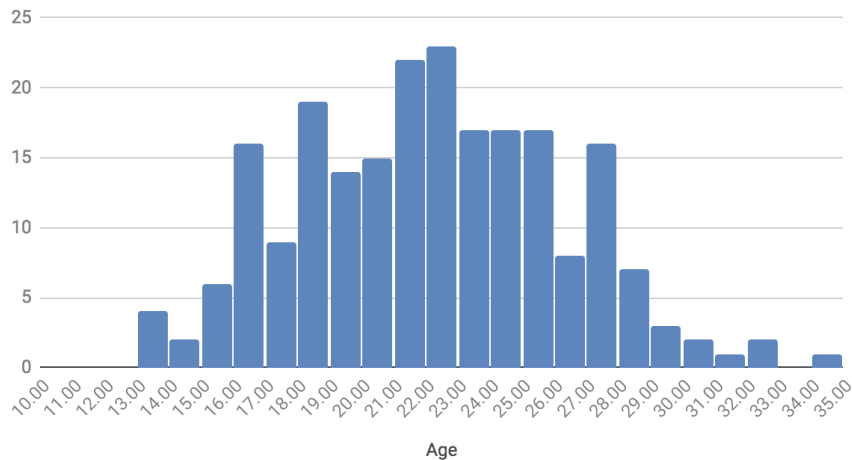


Figure 13: age of subjects in Europe

Breakdown of Age (USA)

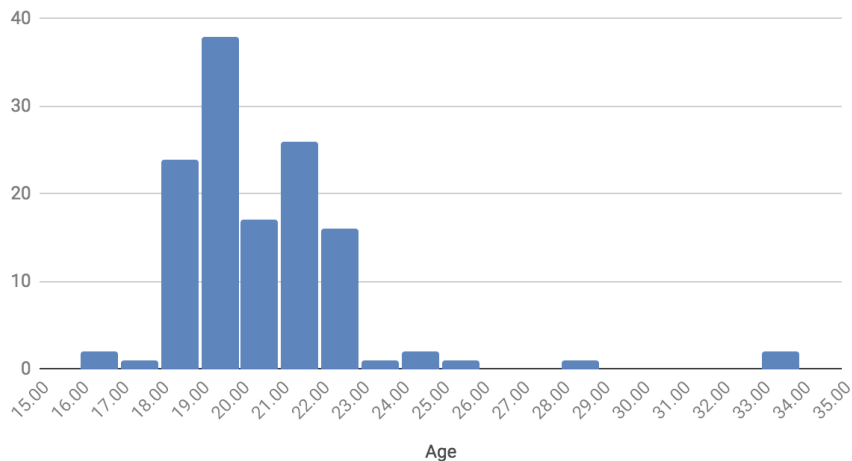


Figure 14: age of subjects in US

The initial questions of the survey had to do with baseline consumer behavior, such as, “do you carry a mobile device when shopping” (100% of the subjects responded with an affirmative answer), and “where do you purchase energy drinks”(the majority answered either in a convenience store or grocery store).

The next series of questions were designed to determine if packaging itself influences consumer behavior. Subjects were asked on a scale of 1-5 (1 being least agree, 5 being most agree) if packaging (labeling) influences their purchase (color, graphics, imagery, shape, texture). In Europe, the answers were broad – the

majority in the 3-4 range, but low in the 5 range, indicating packaging does not strongly influence the subjects. In the US, the majority responded with a 4 or 5, indicating that packaging is an influencer.

The next baseline question was “I often pick up the package and handle it before purchasing” (again the subjects were given a scale of 1-5, 1 being least apt to, and 5 being most apt to comply with the behavior). In Europe, the answers were broad with the majority in the 3-4 range and the 1 range. In the US, the majority of the responses indicated that these consumers do pick the package up and handle before purchasing (majority answering with a 4-5). This response indicates that packaging, again influences the subjects in the US more than the subjects in Europe.

Next, subjects were asked, “I will often use my mobile device to interact with the package for more information (specifically for energy drink consumption). Subjects were given a scale of 1-5, 1 being least apt to, and 5 being most apt to participate in the behavior. Overwhelmingly, subjects answered negatively to the question, indicating even though they have their mobile devices with them in-store, they do not necessarily use them to interact with the package itself when making a purchase (Figures 15, 16).

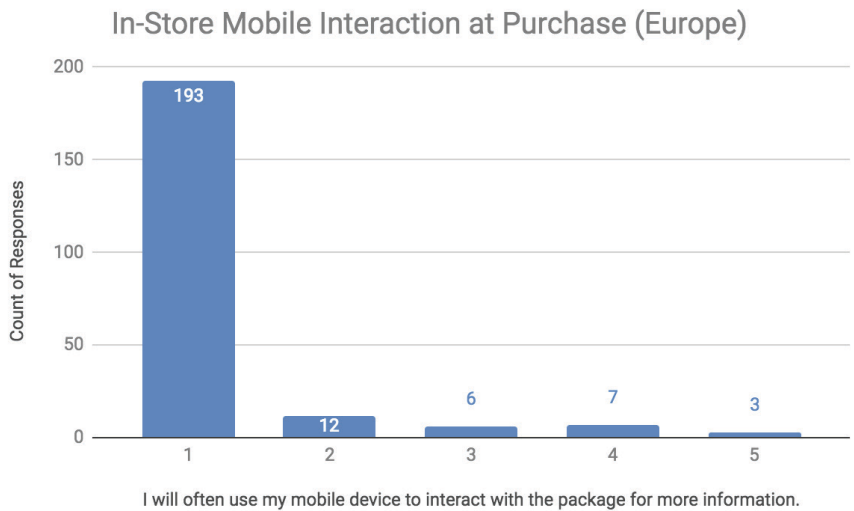


Figure 15: subjects in Europe do not use mobile device to interact with packaging in-store

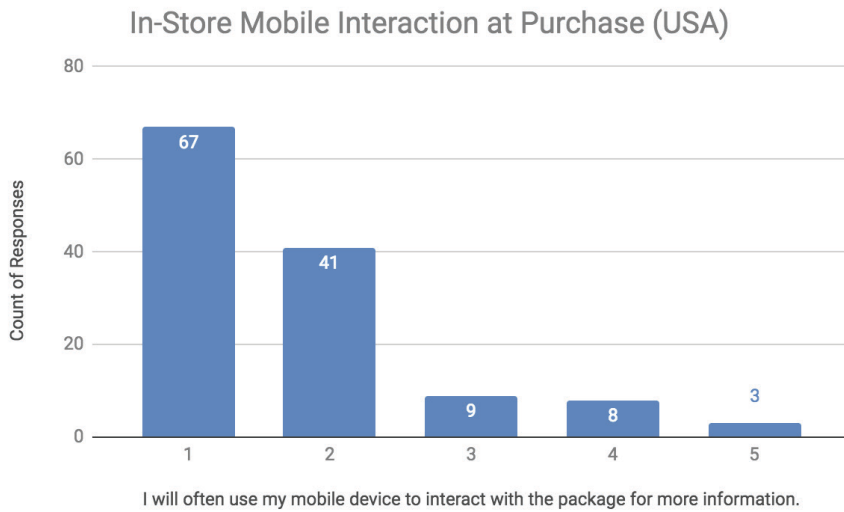


Figure 16: subjects in US do not use mobile device to interact with packaging in-store

This data presents the opportunity to see if the interactivity with the specific technologies could influence these consumers to be more interested in purchasing the products. Subjects were asked to hold the cans of energy drinks and use the mobile device supplied to them to interact with the packaging for the different experiences each technology provided. They were then asked to rank on a scale of 1-4 how likely they would use these technologies in-store based on their experience (1 being most likely, 4 being least likely).

The results of the subject experiences with the technologies (including graphics only) varied by region, as seen in figures 17, and 18. The order of interactivity shown to subjects was the same for all. First was no interactivity (graphics only), followed by QR code, followed by NFC, followed by AR. The recorded data were exported into graphs indicating the number of subjects that preferred a certain interactivity based on the ranking of 1-4.

The European responses/results were: rank 1, AR; rank 2, NFC; rank 3, QR; and rank 4; graphics only (figure 17). In Europe, the subjects, once exposed to the different interactive technologies found them interesting and more engaging than just graphics alone. This is interesting, as these subjects indicated that packaging doesn't influence them in store much.

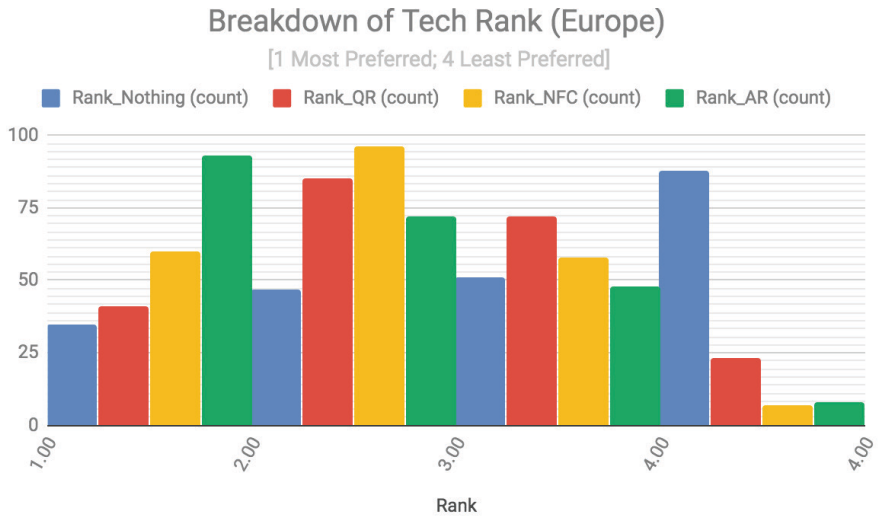


Figure 17: Ranking on technology preference in Europe

The US responses/results were: rank 1, graphics only; rank 2, QR; rank 3, NFC; and rank 4, AR. The US results were the opposite of the European results. In the US, graphics alone was preferred over any of the technologies shown to the subjects.

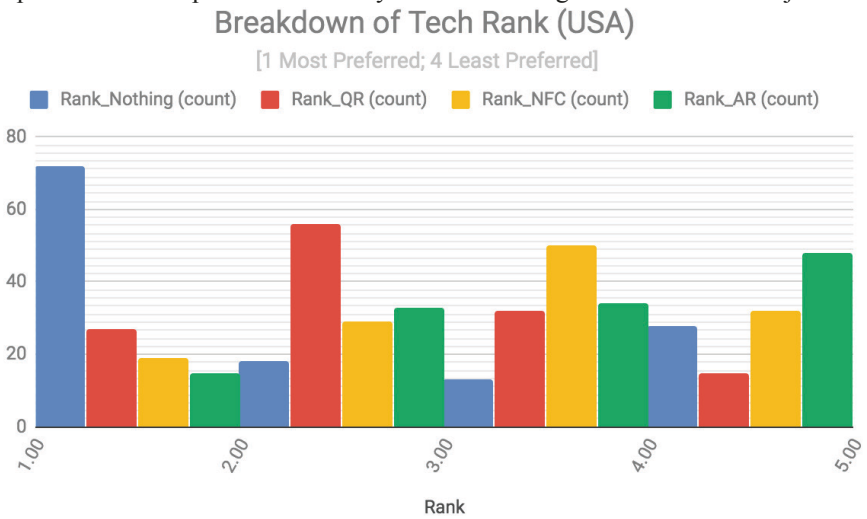


Figure 18: Ranking on technology preference in US

The results of the survey, with subjects from both regions of Europe and US interacting with the energy drinks' different technologies, answered the 4 hypotheses of the initial study as such:

- H1 - Millennials/Generation Z's in the US and Europe prefer interactive packaging vs packaging with no interactivity (i.e. merely printed packaging)
 - Conclusion: In Europe, these consumers did prefer interactive packaging over mere printed packaging, in fact in Europe the subjects ranked the graphics only as the least preferred. However, in the US the subjects did not. In the US mere graphics were preferred over any of the interactive technologies.
- H2 - Millennials/Generation Z's in the US and Europe prefer Augmented Reality over Quick Response codes
 - Conclusion: In Europe, these consumers did prefer Augmented Reality over Quick Response codes, in fact Augmented Reality was ranked first for preference. In the US, the subjects ranked Augmented Reality as the least preferred, and QR ranked second.
- H3 - Millennials/Generation Z's in the US and Europe prefer Near Field Communication over Augmented Reality
 - Conclusion: In Europe, these consumers did not prefer Near Field Communication over Augmented reality, but Near Field Communication was ranked second. In the US, they did prefer Near Field Communication over Augmented Reality.
- H4 - Millennials/Generation Z's in the US and Europe will purchase packaged products based on their experience of interactivity
 - Conclusion: the data does not support a positive outcome for either geographic region. However, there is a stronger case for this to occur based on this experiment in Europe than in the US. These subjects do not think these technologies sufficient to drive to a purchase, but they agreed that they would use the technologies in store over mere graphics alone.

In conclusion, though there are differences in responses of the subjects based on region, there are factors that were not explored for influence. The majority of subjects in the US were women vs. the subjects in Europe were more evenly split. It is unknown if the gender difference could explain any of the differences in responses. The ages of the subjects in the US were narrower (18-25) than the subjects in Europe (16-30). It is unknown if these differences could influence the responses in each region. Lastly, most of the US subjects were interviewed in California, specifically the city of San Luis Obispo, whereas in Europe, the subjects were interviewed in a several countries. Though all subjects were randomly asked

to take part of the experiment in city centers, it is not known if these differences could influence the responses in the different regions.

Additional Learnings

1. The environment is very important (i.e. lighting, internet). Many of the surveys were done indoors under fluorescent or incandescent lighting, and typically the interaction with the energy drink cans and the mobile device were fine, and seamless. However, some of the surveys were done in an outdoor setting and the sunlight can have an impact on the ability for the mobile device to have a successful interaction. For example, on bright days the sun occasionally prevented a successful scan of QR and AR (with the phone camera) because of glare. This was remedied by either finding shade, or using a makeshift cover over the phone.
2. For this study, the NFC tag was under the shrink sleeve. It was very quickly determined that this combination of tag and label, the protective phone case impeded the wireless communication interactivity. The phone case was removed, and the NFC tag and mobile device worked fine.
3. Most subjects don't use an Android phone, so technologies such as NFC may pose a challenge for brands if the other platforms of mobile devices don't support NFC.

Recommendations

1. With this experiment, there is opportunity for brands to consider any of the technologies in Europe – even though the subjects did not feel that the experiences would necessarily drive them to a purchase, they preferred the technologies over mere graphics. Particularly AR and NFC were ranked 1, 2. Brand owners could test these technologies on a regional scale to determine if they get similar responses.
2. The use of technology needs an incentive for Millennials and Generation Z (why should they interact with the package?). The subjects' understanding of the technologies, other than QR codes, was generally low in both regions. For brands considering the use of NFC or AR, a clear call to action – explaining what the consumer needs to do and why – should be apparent.
3. Experiences with the technology need to be memorable and relevant. Many of the subjects, after interacting with the energy drink packaging, were interested in the different experiences, but wouldn't drive them to make a purchase of the product.

4. Technology needs to work on all mobile platforms. The experiment used a single mobile device and had the technology applications pre-loaded. That way, consumers did not have to download apps, and the survey took less time. However, many of the subjects indicated that they do not have an Android device, so the application would have to be platform agnostic to reach the largest audience.
5. Millennials and Generation Z consumers don't have the attention span to wait for technology to work – if the technology takes too much time to function, they have already moved on. Whatever experience is incorporated into the technology must be seamless and work on all types of devices/platforms.
6. Continue this study with more even ages, gender, and variety of cities to determine if results/responses change. In addition, consider a different fast moving consumer good as the demographics may change their beverage preferences as trends change.

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