Editorial

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Citation

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Pokémon Go Warnings: Will they Work?

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Over the past few months, we have witnessed a number of tragedies that could potentially have been prevented. These include the alligator attack on a 2-year old boy at Disney and the shooting of Harambe the Gorilla at the Cincinnati Zoo when a child made his way into the exhibit area. Perhaps, better and more salient warning signs would have made a difference. Recently, there has been a game sweeping the nation called Pokémon Go. The players use global positioning system (GPS) devices to locate these virtual creatures in real-life areas. Consequently, some players are so engrossed in the game that they forget their surroundings. Hence, people have been known to cross streets without looking, wound up in desolate or potentially dangerous areas at night, or even cause traffic congestion. All of these incidents may lead to serious accidents. Although it is equivocal as to whether the manufacturer of Pokémon Go is legally responsible for the accidents and harm to those who play, nevertheless, it appears that new warnings are accompanying the game.[1] Based on the article by Heldman,[1] these warnings include "*Remember to be alert at all times, stay aware of your surroundings*"; "*Do not enter dangerous areas while playing Pokémon Go"*; "*Do not play Pokémon Go while driving*"; "*Do not trespass while playing Pokémon Go*." After each warning is presented, the user clicks on the OK button to reveal the next warning. After all warnings have been acknowledged, then the user may proceed with the game. However, the question is will these warnings really be effective? There are a number of studies reporting that the presence of a warning leads to greater behavioral compliance than not having one.[2-6] In my humble opinion, if a warning can save even one life, then it was well worth the time, effort, and money to construct one. Therefore, what should it take to have an effective warning? In this brief editorial, I will not be able to entertain every facet of a warning. However, I do want to quickly address a handful of variables that may lead to salience and ultimate compliance. These variables include signal words, color, and icons.

SIGNAL WORDS

The American National Standards Institute (ANSI) Z535.4[7] recommended three signal words (DANGER, WARNING. and CAUTION) for indicating potential hazards. DANGER indicates a hazardous situation that will result in death or injury. WARNING indicates a potentially hazardous situation that could result in death or injury. CAUTION indicates a potentially hazardous situation that could result in minor or moderate injury. Hence, DANGER conveyed the greatest perceived hazard value as compared to WARNING and CAUTION.[8,9] In general, results suggest that there is no statistically significant difference in perceived hazard between WARNING and CAUTION.[8,9] However, according to Merriam-Webster,[10] WARNING is "*something that tells someone about possible danger or trouble*" whereas CAUTION is defined as "*care taken to avoid danger in risk*; *a careful attitude or way of behaving; a warning telling someone to be careful*". Although one would expect that there would be statistically significant differences in perceived hazard level given the ANSI definitions, it seems more plausible that individuals interpret WARNING and CAUTION in a similar manner given their dictionary definitions.

These three signal words may be overused or are placed in situations that may not warrant them. For example, "WARNING: Do not download copyrighted material without express written permission". In accordance with the ANSI standards, there would be no physical injury associated with violating copyright. Moreover, how often have you driven through a potential

construction site with the sign: "WARNING: Flagman Ahead", and there is neither a flagman nor construction? Hence, we tend to habituate to these signal words. Therefore, Wogalter and Silver[8] initially examined a group of 84 potential signal words based on understandability. The field was eventually dropped to 20 which had "adequate" understandability ratings yet ranged a wide gamut of perceived hazard. For example, DEADLY, FATAL, and POISON were at the top of the perceived hazard level; URGENT, BE-WARE, and WARNING, were in the middle; whereas NEEDED, NOTICE, and NOTE were at the bottom. Many of these words have been tested across a number of different populations (e.g., children, college-students, non-native English speakers), and there have been relatively similar results concerning understandability and perceived hazard levels.[9] When dealing with developmentally disabled individuals, Silver et al[11] recommended using words such as NO, DON'T, and WARNING as they had high understand-ability ratings.

COLOR

Colors connote a certain type of hazard. For example, if we examine the color of traffic lights, red indicates stop, yellow means approach with caution, and green connotes proceed safely. Similarly, Westinghouse[12] paired the signal words DANGER, WARNING, and CAUTION with the colors red, orange, and yellow, respectively. The ANSI Z535.1[13] provided a similar standard but also added blue and green to convey safety information and safe conditions, respectively. The International Organization for Standards (ISO)[14] also published similar guidelines, but with subtle differences compared to the ANSI Z535.1 standards. Therefore, the standards provide a hierarchy of connoted hazard level with the respective color.

Indeed, in terms of perceived hazard, Braun and Silver[15] found that red and orange had a higher perceived hazard level than black, green, or blue. Although red was significantly higher than orange, there was no statistically significant difference among black, green, or blue with regard to perceived hazard level. There has been a bit of equivocal literature concerning black and red with regard to perceived hazard level. For example, Silver et al[16,17] found that black was rated higher in perceived hazard as compared to red.

With regard to behavioral compliance, Wogalter et al[6] demonstrated that a chromatic warning led to greater behavioral compliance of a non-potable drinking water fountain sign than an achromatic one. Likewise, Wogalter et al[18] found that red and yellow fonts led to fewer errors for connecting car battery jumper cables than an achromatic warning.

INTERACTION WITH SIGNAL WORD

Many of the independent variables that are associated with warnings are not necessarily independent. That is, there are interactions among them. For example, Adams and Edworthy[19] demonstrated an interaction between signal word and color, font size, and border width with regard to perceived hazard. Likewise, Braun and Silver[15] reported a statistically significant interaction between signal word and color. Participants rated 21 words across 5 colors in terms of perceived hazard. For example, DANGER printed in blue had a similar perceived hazard level as STOP written in orange or NOTICE printed in red. Moreover, DEADLY written in blue had a similar perceived hazard rating as CAREFUL printed in red. These results indicate that a high level hazard word (DEADLY) printed in a lower level hazard color (blue) will have a similar perceived hazard level to CAREFUL (low to mid-level hazard word) written in red (high perceived hazard level). In short, there is an averaging effect of perceived hazard. Finally, Silver et al[16] found a three-way interaction among signal word, color, and product type with regard to perceived hazard. In sum, these results suggest that there should be congruency among signal word, color, and product with regard to perceived hazard. That is, DANGER should be written in red on a chain saw as all three variables would normally have a high perceived hazard. However, if there is an incongruency such as CAREFUL (low to mid-level hazard) written in green (low hazard) on a muriatic acid bottle (mid- to high level hazard), then this would probably lower the overall perceived hazard level of muriatic acid, thereby potentially leading to lesser compliance. Hence, signal words printed in color can increase salience, offer a solid connoted level of perceived hazard (especially if congruent), and potentially increase behavioral compliance. However, another way to enhance noticeability and behavioral compliance is to include icons on warnings.

ICONS

Of course, we have all heard the adage a picture is worth a thousand words. The ANSI Z535.3[20] standards indicate that for a symbol or icon to be acceptable, it must be comprehended by at least 85% of the sample with no more than 5% critical confusion errors. A critical confusion error is one that can lead to a misinterpretation of the icon.[21] For example, if there is a slash through a hand, which is a standard symbol indicating "do not enter", and then it is conceivable that an interpretation could be "do not touch".

One way to try and avoid critical confusion errors is to make sure that the icons are more concrete rather than abstract in

their interpretation. A concrete or representational symbol is one that depicts an easily recognizable object.[22] For example, if one is shown a picture of an ear (e.g., medication for the ear), then this would be considered a concrete symbol. An abstract symbol, on the other hand, has a less direct relation to the concept.[22] For example; a pharmaceutical symbol of a person with waves surrounding the head indicates that the medication would be taken for anxiety. Arbitrary symbols have no relation to the concept at hand.[22] For example, an international traffic sign depicting a plain white circle contained within a brown bordered circle would indicate "no vehicles allowed". In this case, it might be more prudent to show vehicles and put a diagonal slash through them. In general, concrete symbols are comprehended better than abstract or arbitrary ones.[23]

An icon by itself may provide salience,[24] but given the potential critical confusion errors, it would be more logical to pair it with congruent text. The text could include a signal word and a brief message stating what one should not do and the consequences thereof for performing that particular behavior. It has been shown that icons may facilitate greater behavioral compliance than simple text alone.[25] However, with regard to medication schedules; there may be no statistically significant difference in comprehension and memory.[26] Nevertheless, in order to develop a reasonable warning, a concrete icon (preferably) should be included to enhance salience and potential behavioral compliance. Therefore, given these variables, will the new Pokémon warnings work?

CONCLUSIONS

Although warnings may enhance compliance as compared to no warnings,[2-6] the question becomes one of adequacy. Given the Pokémon Go warnings as mentioned by Heldman,[1] there are neither signal words nor icons. The warning itself should not be written in a safety color such as green given that there is a potential hazard. Moreover, the warning simply states what not to do rather than what the potential consequences may be for doing so. Perhaps constructing a warning with a signal word such as "DANGER" written in red or orange (Helvetica type) coupled with an icon within a circular border depicting someone playing Pokémon Go on their phone with a diagonal slash (from top right to bottom left) through the icon indicating a prohibited action along with the verbiage written in black on a white background (to increase legibility) would be more logical in attempting to increase salience and possibly prevent accidents. Of course, all these should be in a reasonably large font size in order to increase salience.

My belief, however, is that given these new warnings as shown in Heldman,[1] the vast majority of individuals will hit the OK button four times without reading (or processing) the quick message in order to obtain the reinforcement of playing the game. Therefore, it is equivocal to this author what the major advantages are for these types of warnings. Thus, with the type of warning proposed here, it is certainly conceivable that the majority of users might continue to hit OK many times in order to reach the actual game. However, it is just as or more likely that this warning might attract the user's attention which would allow them to read and digest the information. This might lead to greater compliance and hopefully result in fewer dangerous situations, accidents, and mishaps.

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