BEHAVIORAL ECONOMICS 2025 GUIDE

Introduction
Ernst Fehr

Guest Editorial
Suzanne Shu
Geoffrey Fisher
David Just
Stephen Shu

Editor
Alain Samson

Symbolic Decision Support: Enhancing Financial Help-Seeking and Investment Decisions Using GenAI Imagery

CHRISTELLE T. NGNOUMEN[1] AND KIM H. NGUYEN

Voya Financial

The use of financial advice can help individuals make smarter financial decisions. So why aren't more people using financial information that is available to them? In an online experiment, we examined the effectiveness of imagery in promoting the use of financial guidance, and we established that imagery that addresses barriers to financial help-seeking can influence decisions to adopt financial guidance. Imagery was generated with the assistance of Generative AI (GenAI). We also determined that the use of guidance reduces investment mistakes on a hypothetical investment allocation task. This work demonstrates a collaborative framework between behavioral designers and GenAI, wherein individuals guide the conceptual and experimental direction while GenAI provides multiple visual options. The chapter closes with implications for financial investment and discusses the application of human-AI collaboration in content design and testing.

Introduction

Picture this: an employee at a new job is enrolling in a 401(k) plan and is scrolling through endless streams of text, data, and jargon. After selecting a portion of their paycheck to contribute to retirement, the employee is prompted to invest their contributions. They are presented with a list of investments to choose from. While some of the investments on the list are familiar, others are not. The employee becomes overwhelmed by the options. Before they can reach for any initial or familiar information to reduce their discomfort and quickly click "next," an icon offering guidance appears. The employee decides to use this guidance and is encouraged to protect their portfolio from market fluctuations by spreading risk across different asset classes. A thoughtfully designed icon helps the employee take their next best step. It becomes the difference between satisficing, to quickly click "next," and optimizing, to achieve the best possible outcome.

Over the past fifty years, a significant shift has occurred in the United States retirement system with employers moving away from offering defined benefit plans (i.e., pensions) to providing defined contribution (DC) plans such as the 401(k). About half of private industry workers in the US participate in a DC plan (Cerulli Associates, 2024; Employee Benefit Research Institute, 2023). This shift has transferred important retirement decisions to individual employees, including when to start saving, how much to save, how long to save for, and how to invest their savings. As of 2024, there were more than 720,000 employer-sponsored 401(k) plans in the US, covering over 86 million active participants and millions of former employees and retirees (Investment Company Institute, 2024). Even with the advent and popular application of target date funds—a type of investment that automatically adjusts its asset allocation over time to help investors reach their retirement goals, facilitating a "set and forget" approach—a significant portion of private industry workers still choose to invest their savings themselves, thereby highlighting the importance of guidance and support for their investment decisions.

Only about 46% of US consumers have adopted financial technology despite high consumer awareness levels (Statista, 2024). While financial guidance is widely recognized as important, actual adoption

1 Corresponding author: christelle.ngnoumen@voya.com

rates vary depending on factors such as income levels and access to financial education resources (Amnas et al., 2023). The use of financial guidance can help consumers navigate complex decisions related to their savings, investments, and other financial topics, and it has been shown to improve investment performance, increase portfolio diversification, and increase financial literacy (Collins, 2012; Marsden et al., 2011; Mihaylov et al., 2015). Despite the extensive amount of evidence demonstrating a positive impact of financial guidance on financial wellness outcomes (Lusardi & Messy, 2023; Lusardi & Streeter, 2023; Mercado et al., 2024), there are many barriers to both seeking and using this help.

Barriers to Financial Help-Seeking

Common barriers to seeking financial advice include concerns about associated costs, misunderstanding the value proposition (i.e., what financial help involves and what one can gain from it), the motivation to save time, embarrassment (i.e., feeling ashamed about one's financial situation or about appearing incompetent), prescriptive norms (i.e., perceptions of what should or should not be done to manage finances), low financial literacy, and not trusting financial advisors (Westermann et al., 2020). There is therefore a need for evidence-based and innovative interventions to support people in seeking financial help.

Using Imagery to Drive Smarter Financial Decisions

Given the widespread use of visuals, it is surprising that finance literature has paid limited attention to imagery (Ronen et al., 2023). While text-based information is more commonly used on financial platforms, and more readable text facilitates comprehension and informed decisions (Loughran & McDonald, 2016; Tan et al., 2015), visual imagery can play a similar—if not more critical—role in facilitating financial decision-making. Research has highlighted the role of visual factors like salience, position, and size in guiding attention during decision-making and on decision outcomes (Orquin et al., 2021). Additional research has found an influence of color on financial decisions; for example, when financial losses are displayed in red, individuals tend to become more cautious and expect lower future stock returns (Bazley et al., 2021). Research has also found that people anchor their evaluations to specific items in financial documents, leading to biased choices; in this case, for instance, if an annual fee is prominently displayed at the top of a document, it can disproportionately influence decision-making, even if other charges compensate for that amount (Ceravolo et al., 2022).

Visual imagery can help increase the visibility and adoption of financial help services. Beyond the demonstrated ease with which visualizations captivate our focus and direct our bottom-up attention (Carrasco, 2011; Corbetta & Shulman, 2002; Desimone & Duncan, 1995; Kahneman, 2011; Kastner & Ungerleider, 2000), additional benefits of leveraging this content form include its ability to act as a visual cue that can be quickly recognized and interpreted without relying solely on text, particularly when people skim copy. Symbolic imagery, such as icons, helps reduce cognitive load and facilitate decision-making by simplifying complex ideas in a glance. It can also improve accessibility by providing information intuitively, particularly for individuals with cognitive impairments or language barriers, and by allowing for descriptive text readable by screen readers and individuals with visual impairments (Homer & Gauntt 1992).

In an online experiment designed to simulate the digital experience of investment selection, the following research examined whether imagery addressing barriers to financial help-seeking can influence decisions to adopt financial guidance and optimize investment allocations. GenAI assisted in the creation of symbolic visual imageries.

Experiment Design

After progressing through a survey invitation email on a third-party research platform (*Qualtrics*), 700 participants (recruited from a research panel) were randomly assigned to one of eight experimental conditions that varied in terms of the imagery presented alongside a financial guidance prompt. The independent variable was the *symbolic imagery* associated with a guidance prompt shown prior to completing a hypothetical investment allocation task. Symbolic imagery consisted of five GenAI-based images designed to address five common barriers to financial help-seeking: financial literacy, overconfidence,

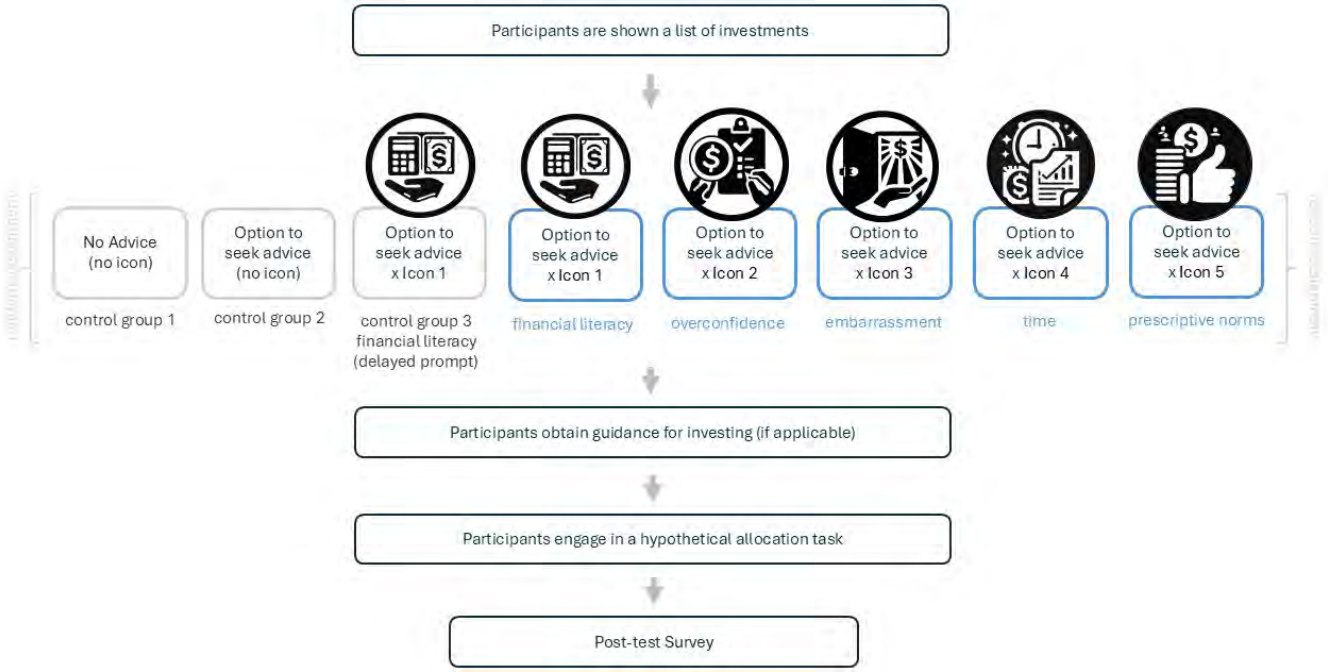

Figure 1: Experimental design. The eight experimental conditions and their respective symbolic imagery.

embarrassment, time, and prescriptive norms. The major dependent variables included *Guidance Adoption* (whether a participant decided to use guidance during the investment allocation task) and *Investment Mistakes* (the types and frequencies of investment mistakes made on the investment allocation task) (Figure 1).

Participants

The study included part- and full-time employees with access to employer benefits. Participant ages ranged from 23 - 88 years (Mean*age* = 58 years; *SDage* = 11.37). The sample was 59% male, 25% female, and 16% did not disclose their gender identification. In the sample, 56% were White, 6% Asian, 6% Black or African American, 6% Hispanic or Latino, 3% Multiracial, 1% Native and Indigenous Peoples, and 23% did not disclose their race and/or ethnicity. In terms of education, 14% had a high school degree or some college education, 40% had a college degree, and 35% had a graduate degree. Finally, 7% had an annual household income below $50,000, 46% had an annual household income between $50,000 and $150,000, and 46% had an annual household income above $150,000.

Hypothetical Investment Allocation Task

In an expanded adaptation of Hung and Yoong's (2013) computerized task, participants viewed a list of ten investment funds for investing their money in a retirement savings account. The investment menu contained a range of fund options, including a money market fund, a bond market fund, a balanced fund, a large cap value fund, a large cap growth fund, a small cap value fund, a global fund, a real estate investment fund, a target date fund, and a commodity fund. Ten investment options were included to mirror the average number of investment options offered by 401(k) plans (Investment Company Institute, 2024). The average 10-year performance for each fund type was provided, and fees were kept the same across all funds. Participants were asked what percentage of their savings they would like to allocate to each fund. Prior to making their allocations, participants in seven of the eight conditions were asked if they would like to receive guidance while making their choices. The same text was used across all seven conditions (e.g., *Would you like to receive some guidance while making these choices?* [Yes; No]).

In six of the eight conditions, symbolic imagery related to barriers to financial help-seeking accompanied the guidance prompt. If a participant declined the use of this guidance, they would move on to a screen with the same ten investment funds and have a chance to enter any value between 0% and 100% for each fund. Their total allocations needed to amount to 100% across all funds. If a participant

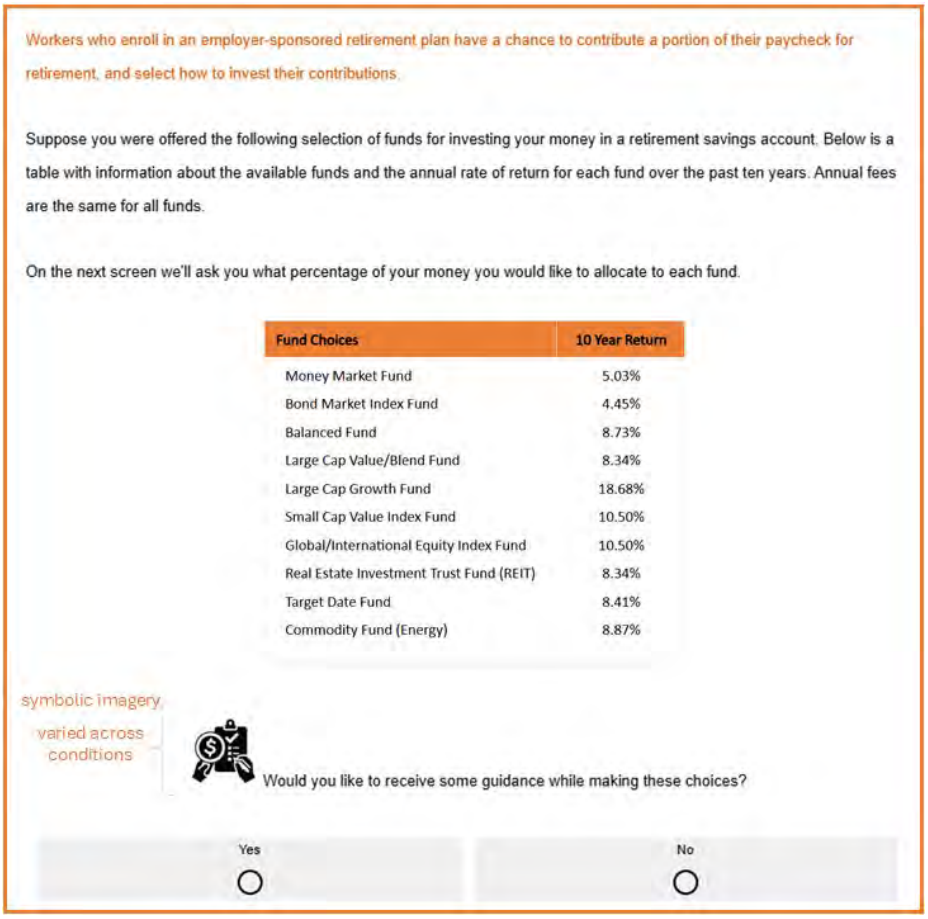

Figure 2: A representation of the hypothetical investment allocation task, including instructions, ten investment fund types, and symbolic imagery addressing overconfidence-related barriers.

opted to receive guidance, they would move on to a screen similar to the one allocated to those who declined, albeit with the addition of a section on top of the screen that provided four guidelines for investing. The four guidelines were informed by Mottola and Utkus' (2009) identification of commonly accepted investment portfolio mistakes, including holding a zero balance in equities (i.e., not investing), holding an equity balance of less than 40% (i.e., being under-conservative), holding an equity balance more than 95% percent (i.e., being overly aggressive), and holding a portfolio that is 100% in a single asset class (i.e., being under-diversified) (Figure 2).

Questionnaire

The hypothetical investment allocation task was followed by a questionnaire assessing *Age, Gender, Race and Ethnicity, Education, Income, Investing Experience, Risk Tolerance, Financial Literacy, Financial Self-Efficacy, and Barriers to Advice-Seeking.* Demographic and psychographic factors did not differ by condition.

GenAI Image Development and Pilot Testing

Experimental imagery was created using *CoPilot's Design* tool. A specific set of prompts outlining each image's salient information and functional properties was designed and submitted by the authors to generate simplistic symbolic imagery. All prompts included instructions to generate imagery that was "simplistic," "grayscale," "round in shape," "included a dollar sign," and "included a supportive hand" to minimize differences across the images that were not related to key symbolic properties brought to the foreground. This helped increase the salience of key symbolic properties in the visualizations and was informed by research illustrating that viewers are biased by salient information in a visualization. It was also informed by research suggesting that images with groupings of three components or fewer facilitate feature integration and comprehension (Fabrikant et al., 2010; Hegarty et al., 2010; Padilla et al., 2017; Schirillo & Stone, 2005; Stone et al., 2003; Treisman & Gelade, 1980).

An original set of 12 images was evaluated by ten independent raters in terms of their perceived *Attractiveness*, *Familiarity*, *Credibility*, and *Quality*. Each rater evaluated all images (in randomized order) along the four dimensions. The five images used in the experiment included those that scored comparably. The raters were also asked to describe what each image meant or represented to them, including the associations, thoughts, or feelings each image evoked. Pilot testing of the content suggested distinct, symbolic themes across the five images, corresponding to (1) *financial literacy* (e.g., "budgeting and money management;" "help with calculating needs and saving;" "help calculating your financial future"), (2) *overconfidence* (e.g., "a checklist where saving money is one [of many] components;" "a to-do list with my financial tasks;" "steps and help to improve my financial situation;" "knowing what to do next based on a list or plan"), (3) *embarrassment* (e.g., "unlocking a hidden door where money questions become clear;" "opening doors to a better financial future;" "a bright future"), (4) *time* (e.g., "this image represents revenue growth over time;" "organizing my finances in a timely way"), and (5) *prescriptive norms* (e.g., "the thumbs up reminds me of [social media platform];" "savings and positive outlook because of the thumbs ups;" "better prepared for a wholesome financial future;" "team-based financial planning") (Figure 3).

The first hypothesis tested in this experiment was that guidance prompts, presented with imagery addressing barriers to financial help-seeking, increase guidance adoption during a hypothetical investment allocation task compared to a control. The second hypothesis tested was that the use of guidance optimizes decisions (i.e., reduce mistakes) on the hypothetical investment allocation task.

Results

There was a significant relationship between symbolic imagery and the decision to use guidance (or not), χ^2 (5, N = 535) = 18.05, p = .003 (Cramer's V = 0.2; 1-β = .96). Post-test comparisons (with Bonferroni correction) of the five symbolic imagery conditions against a control revealed a significantly greater proportion of guidance adoption within the Overconfidence condition compared to the No Icon Control condition (p < .05). The Prescriptive Norms condition drove significantly less guidance adoption compared to the No Icon Control condition (p < .05). The guidance adoption rates for the Time, Embarrassment, and Financial Literacy conditions were not significantly different from the No Icon Control condition, which

Figure 3: Symbolic imagery with corresponding functional properties, GenAI prompts, and evidence guiding content creation.

was not significantly different from chance (i.e., 50%) (Table 1).

The use of guidance was associated with fewer investment mistakes on the hypothetical investment allocation task, χ^2 (1, N = 617) = 13.53, p < .001 (Cramer's V = 0.15; 1–β = .96). More specifically, individuals who used guidance demonstrated greater diversification (p < .001) and a lower proportion of overly aggressive portfolios compared to those who did not use it (p < .01).

Several demographic and psychographic factors predicted financial guidance adoption. Females were more likely to choose guidance compared to males, p < .001. Individuals whose highest level of education was high school or some college were more likely to choose guidance compared to those with college degrees or higher, p < .05. Individuals with little to no prior experience in investing were also more likely to choose guidance compared to those with intermediate or advanced experience, p < .001. Individuals with moderate risk tolerance were more likely to choose guidance compared to those with conservative or aggressive risk tolerance, p < .001. Those with lower financial literacy were more likely to choose guidance compared to those with higher financial literacy, p < .001. Similarly, individuals with lower financial self-efficacy were more likely to choose guidance compared to those with higher financial self-efficacy, p < .001.

General Discussion

This research complements and expands on prior literature on the effects of visual imagery—as a content format incremental to text—on investors' decisions (Luffarelli et al., 2019; Ronen et al., 2023). It provides evidence of the impact of symbolic imagery on guidance adoption, and of guidance adoption in optimizing investment decisions, and it is one of few studies to incorporate GenAI as a collaborative tool in content intervention development, gradually harnessing AI's full potential in behavioral design and experimentation. GenAI helped speed up the experimental design process and the testing of behaviorally informed content to optimize financial choices. Visual imagery that is informed by an understanding of behavioral barriers can enhance user engagement with financial platforms, leading to increased interaction, better decision-making, and improved outcomes.

Table 1: Guidance Decision by Symbolic Imagery

Symbolic Imagery	Guidance Decision		Total (Row)
	Yes	No	
No Icon (Control)	54.4% (49)	45.6% (41)	100% (90)
Financial Literacy	44.1% (45)	55.9% (57)	100% (102)
Overconfidence *	67.5% (56)	32.5% (27)	100% (83)
Embarrassment	49.5% (45)	50.5% (46)	100% (91)
Time	56.5% (48)	43.5% (37)	100% (85)
Prescriptive Norms *	38.1% (32)	61.9% (52)	100% (84)
Total	51.4% (275)	48.6% (260)	100% (535)

Note: Counts in parentheses; χ^2 (5, N = 535) = 18.05, p = .003
* Overconfidence > Control, p < .05; Prescriptive Norms < Control, p < .05

Addressing Overconfidence Bias in Financial Help-seeking

Prior work finds that visualizations can be used to reduce decision-making biases, including anecdotal evidence bias, side effect aversion, and risk aversion (Fagerlin et al., 2005; Waters et al., 2007; Weinstein et al., 2006). This work presents evidence that visualizations can also be used to mitigate confidence-related barriers to financial help-seeking. Overconfidence bias is a well-established cognitive error whereby individuals overestimate their abilities and knowledge, leading to poor decision-making, including under-diversification, excessive trading, and taking excessive risks. Nearly half (49%) of the current study's sample indicated that confidence in managing their finances on their own was a top barrier to seeking financial help. Self-reported confidence in one's ability to save and invest was related to the number of investment mistakes made on the hypothetical allocation task, suggesting that individuals with higher confidence demonstrated a greater proportion of mistakes (35%) compared to those with lower confidence (29%), p = .05. Behavioral designers and choice architects can address overconfidence bias by introducing reflective periods before critical decisions, encouraging the diversification of sources of information, and promoting self-checking.

Limitations

This study has limitations that should be considered when interpreting the findings. Firstly, convenience sampling limits the generalizability of the results to groups with similar characteristics to the research sample. Additionally, reliance on a hypothetical task means responses may differ from real-world behavior. That said, hypothetical performances seemed to align with behavioral patterns observed in the industry and replicated prior research findings (Hung & Yoong, 2013). Future research should use larger and more diverse samples to mitigate these issues. Despite these limitations, the study provides valuable insights into promoting financial help-seeking and financial guidance adoption.

Cognitive theory (Vessey, 1991) suggests that when viewing imagery, people compare a learned mental schema to the visual image. Visualizations that do not match the mental schema require cognitive transformations to align them as well as mental representations. When a viewer is forced to mentally transform a visualization to match their mental schema, this increases the demands on their working memory as well as mental processing steps and task completion time (Evans & Stanovich, 2013; Kahneman & Frederick, 2002; Lohse, 1997). In the current study, individuals in the condition involving an icon signaling prescriptive norms adopted financial guidance

at a significantly lower rate than individuals in a control group. While task decision times, perceived attractiveness, credibility, familiarity, and quality did not significantly differ across the icons used in the study, it is possible that another domain not captured during pre-testing of this icon introduced a greater degree of abstraction (i.e., interpretation) and impacted the participants' willingness to adopt financial guidance.

Design and Content Contributions

This research has several practical implications for behavioral designers and content creators. Based on the current findings, we recommend that designers of financial platforms aim to complement text-based content with symbolic, visual imagery that addresses known barriers to action. Furthermore, content and behavioral designers can capitalize on Type 1 processing to help viewers seek and adopt financial guidance by highlighting symbolic associations that are already held in long-term memory and are easier to apply automatically.

This early example of combining human judgment and GenAI creates opportunities for behavioral designers with design interests—but without specialized training—to speed up their iterative testing and learning efforts, particularly when design resources are limited. The availability of capabilities like GenAI can speed up design workflow and contribute to design practice, especially in environments that prioritize testing and learning over perfectionism. However, rather than replacing design professionals, this practice recommends still consulting with them along the way. This study involved consulting with our design partners to inform the conceptualization of imagery leveraging iconographic properties and modifying GenAI-based imagery. This may naturally lead us to the question of how to keep human judgment at the center of human-AI collaboration. We believe the answer lies in designing prompts.

Effective Prompt Design

Ultimately, placing human judgments at the center of the process starts with effective prompts that are structured with clarity and include multiple rounds of refinement. A couple of examples gained from this experiment include:

- Specifying design elements: instructions detailing color schemes, number of components, relationships among components, and aesthetic preferences.
- Using affirmative phrasing in prompts: observations from the prompt creation process seem to suggest prompts that detail desired actions (e.g., *design an icon that has/does x, y, z*) were more effective than those focused on actions to avoid (e.g., *design an icon that does not/is not x, y, z*). Research in behavioral psychology supports this idea, i.e., that explicit, positive instructions lead to better outcomes than avoidance-based directives, since the former provides a clear roadmap for action while the latter may introduce more room for interpretation.
- Paying attention to (and correcting for) unintended features or biases: notable gender biases in the AI outputs for finance-related content were observed, and they frequently leaned toward male-coded imagery (e.g., depictions of figures with collared shirts, ties, or briefcases).

Implications for Communication

Our findings suggest broader implications for how we communicate in digital environments. Visual imagery already serves as an important communication cue that can be processed quickly and efficiently. As AI technology continues to advance, these visual imageries will become even more common and sophisticated. To avoid silos and ensure consistent interpretation, this growth will require proactive collaboration to not only enable replication and refinement, but also foster the collective development of best practices in AI-assisted visual communication design and testing. Furthermore, we recommend that future research compares GenAI-generated images and those created by humans. This comparison could provide not only valuable insights into the effectiveness and performance of these images, but also recommendations for enhancing collaboration between AI and human creators. By sharing this study, we encourage fellow researchers and practitioners to explore and share their applications of AI in behavioral science.

THE AUTHORS

Christelle Ngnoumen is AVP of Behavioral Science Research at Voya Financial, where she leads research and experimentation efforts focused on helping people boost their savings and benefits utilization and on optimizing the customer experience. As a behavioral scientist and research leader, she leverages behavioral science to design digital experiences and communications that help people make better decisions and improve their wealth and health outcomes. Prior to Voya, she led behavioral science at Headspace, a leading provider of wellbeing and mental health solutions. She has also worked with companies and government agencies on digital experiences and services to improve social outcomes. Christelle holds a Ph.D. in Experimental Psychology from Harvard University.

Kim Nguyen is a customer experience consultant at Voya Financial. Kim leads and supports research, mapping, and testing initiatives. She integrates behavioral science to transform customer insights into actionable recommendations, bridging the gaps between current and future state experiences, and applying academic research to industry practices. She has worked in domains such as journey management, financial literacy, benefit communications, eDelivery adoption, and retirement enrollment. Kim's professional interests center on exploring the barriers people face in making financial decisions, helping them achieve their financial goals and cultivate a healthier relationship with money, thereby increasing their well-being. She holds a Master's degree in Behavioral and Decision Sciences from the University of Pennsylvania and a Bachelor's degree in Psychology from Penn State University.

REFERENCES

Amnas, M. B., Selvam, M., Raja, M., Santhoshkumar, S., & Parayitam, S. (2023). Understanding the determinants of FinTech adoption: Integrating UTAUT2 with trust theoretic model. *Journal of Risk and Financial Management, 16*(12), 505. https://doi.org/10.3390/jrfm16120505

Barber, B. M., & Odean, T. (2001). Boys will be boys: Gender, overconfidence, and common stock investment. *The Quarterly Journal of Economics, 116*(1), 261-292. https://doi.org/10.1162/003355301556400

Bazley, W. J., Cronqvist, H., & Mormann, M. (2021). Visual finance: The pervasive effects of red on investor behavior. *Management Science, 67*(9), 5616-5641. https://doi.org/10.1287/mnsc.2020.3747

Carrasco, M. (2011). Visual attention: The past 25 years. *Vision Research, 51*(13), 1484-1525. https://doi.org/10.1016/j.visres.2011.04.012

Ceravolo, M. G., Farina, V., Fattobene, L., Leonelli, L., & Raggetti, G. (2022). Anchoring effect in visual information processing during financial decisions: An eye-tracking study. *Journal of Neuroscience, Psychology, and Economics, 15*(1), 19-30. https://doi.org/10.1037/npe0000153

Cerulli Associates. (2024). *U.S. Retirement End-Investor 2023: Personalizing the 401(k) Investor Experience.* (Report No. WA-RD 896.4). Report and recommendations from Cerulli Associates. https://pro.europeana.eu/files/Europeana_Professional/Europeana_Network/metadata-quality-report.pdf

Collins, J. M. (2012). Financial advice: A substitute for financial literacy? *Financial Services Review, 21*(4), 307-322.

Corbetta, M., Kincade, J. M., & Shulman, G. L. (2002). Neural systems for visual orienting and their relationships to spatial working memory. *Journal of Cognitive Neuroscience, 14*(3), 508-523. https://doi.org/10.1162/089892902317362029

Davis, M. M., Modi, H. H., Skymba, H. V., Finnegan, M. K., Haigler, K., Telzer, E. H., & Rudolph, K. D. (2022). Thumbs up or thumbs down: Neural processing of social feedback and links to social motivation in adolescent girls. *Social Cognitive and Affective Neuroscience, 18*(1), nsac055. https://doi.org/10.1093/scan/nsac055

Desimone, R., & Duncan, J. (1995). Neural mechanisms of selective visual attention. *Annual Review of Neuroscience, 18,* 193-222. https://doi.org/10.1146/annurev.ne.18.030195.001205

Ely, J. W., Graber, M. L., & Croskerry, P. (2011). Checklists to reduce diagnostic errors. *Academic Medicine, 86*(3), 307-313. https://doi.org/10.1097/ACM.0b013e31820824cd

Employee Benefit Research Institute. (2023, January). *Workplace Retirement Plans: By the Numbers.*

Employee Benefit Research Institute. (2024, April). *401(k) Plan Asset Allocation, Account Balances, and Loan Activity in 2022.* https://www.ebri.org/publications/research-publications/issue-briefs/content/401(k)-plan-asset-allocation--account-balances--and-loan-activity-in-2022

Evans, J. S. B., & Stanovich, K. E. (2013). Dual-process theories of higher cognition: Advancing the debate. *Perspectives on Psychological Science, 8*(3), 223-241.

Fabrikant, S. I., & Hall, L. E. (2010). The role of visual and verbal information in the comprehension of statistical graphics. *Journal of Experimental Psychology: Applied, 16*(2), 147-1622.

Giorgadze, N. (2008). The Greater Reality Behind Doors. *Ethnographica*, 19-28. https://soc.kuleuven.be/antropologie/ethnographica/2008/3Giorgadze.pdf

Hegarty, M., Canham, M. S., & Fabrikant, S. I. (2010). Thinking about the weather: How display salience and knowledge affect performance in a graphic inference task. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *36*(1), 37-53. https://psycnet.apa.org/doi/10.1037/a0017683

Homer, P. M., & Gauntt, S. G. (1992). The role of imagery in the processing of visual and verbal package information. *Journal Of Mental Imagery-New York-International Imagery Association, 16,* 123-123.

Hung, A., & Yoong, J. (2013). Asking for help: Survey and experimental evidence on financial advice and behavior change. *The Market for Retirement Financial Advice, 182,* 182-212.

Investment Company Institute. (2024). *401(k) Resource Center*. https://www.ici.org/401k

Ismail, A., & Mavis, C. P. (2022). A new method for measuring CEO overconfidence: Evidence from acquisitions. *International Review of Financial Analysis, 79*. https://doi.org/10.1016/j.irfa.2021.101964

James, W. (1890). *The principles of psychology.* Henry Holt and Co.

Kahneman, D. (2011). *Thinking, fast and slow (Vol. 1)*. Farrar, Straus and Giroux.

Kahneman, D., & Frederick, S. (2002). Representativeness revisited: Attribute substitution in intuitive judgment. In T. Gilovich, D. Griffin, & D. Kahneman (Eds.).*Heuristics and biases: The psychology of intuitive judgment* (pp. 49-81). Cambridge University Press.

Kastner, S., & Ungerleider, L. G. (2000). Mechanisms of visual attention in the human cortex. *Annual Review of Neuroscience, 23*, 315-341. https://doi.org/10.1146/annurev.neuro.23.1.315

Luffarelli, J., Mukesh, M., & Mahmood, A. (2019). Let the logo do the talking: The influence of logo descriptiveness on brand equity. *Journal of Marketing Research, 56*(5), 862-878. https://doi.org/10.1177/0022243719845000

Lusardi, A., & Messy, F.-A. (2023). The importance of financial literacy and its impact on financial wellbeing. *Journal of Financial Literacy and Wellbeing, 1*(1), 1-11. https://doi.org/10.1017/flw.2023.8

Lusardi, A., & Streeter, J. L. (2023). Financial literacy and financial well-being: Evidence from the US. *Journal of Financial Literacy and Wellbeing, 1*(2), 169-198. https://doi.org/10.1017/flw.2023.13

Malmendier, U., & Tate, G. (2005). Does overconfidence affect corporate investment? CEO overconfidence measures revisited. *European Financial Management, 11*(5), 649-659. https://doi.org/10.1111/j.1354-7798.2005.00302.x

Marsden, M., Zick, C. D., & Mayer, R. N. (2011). The value of seeking financial advice. *Journal of Family and Economic Issues*, 32, 625-643. https://doi.org/10.1007/s10834-011-9258-z

Mercado, C., Bullard, K. M., Bolduc, M. L. F., Banks, D., Andrews, C., Freggens, Z. R. F., & Njai, R. (2024). Exploring associations of financial well-being with health behaviours and physical and mental health: A cross-sectional study among US adults. *BMJ Public Health, 2*, e000720.

Mihaylov, G., Yawson, A., & Zurbruegg, R. (2015). The decision to seek advice in the self-directed retirement fund industry. *Applied Economics, 47*(32), 3367-3381. https://doi.org/10.1080/00036846.2015.1013620

Orquin, J. L., Lahm, E. S., & Stojić, H. (2021). The visual environment and attention in decision making. *Psychological Bulletin, 147*(6), 597-617. https://doi.org/10.1037/bul0000328

Padilla, L. M., Creem-Regehr, S. H., Hegarty, M., & Stefanucci, J. K. (2018). Decision making with visualizations: A cognitive framework across disciplines. *Cognitive Research: Principles and Implications, 3*, 1-25. https://doi.org/10.1186/s41235-018-0120-9

Ronen, J., Ronen, T., Zhou, M. J., & Gans, S. E. (2023). The informational role of imagery in financial decision making: A new approach. *Journal of Behavioral and Experimental Finance, 40,* 100851. https://doi.org/10.1016/j.jbef.2023.100851

Schirillo, J. A., & Stone, J. V. (2005). The influence of spatial frequency on the perception of facial expressions. *Journal of Vision, 5*(8), 671-6822.

Stone, J. V., Yates, J. F., & Parker, A. M. (2003). The role of visual and verbal information in the comprehension of statistical graphics. *Journal of Experimental Psychology: Applied, 9*(2), 147-1622.

Statista. (2023). *Fintech adoption rate.* https://www.statista.com/statistics/1331176/fintech-adoption-rate/

Treisman, A. M., & Gelade, G. (1980). A feature-integration theory of attention. *Cognitive Psychology, 12*(1), 97-136.

Vessey, I., & Galletta, D. (1991). Cognitive fit: An empirical study of information acquisition. *Information Systems Research*, 2(1), 63-84.

Westermann, S., Niblock, S. J., Harrison, J. L., & Kortt, M. A. (2020). Financial advice seeking: A review of the barriers and benefits. *Economic Papers: A Journal of Applied Economics and Policy, 39*(4), 367-388. https://doi.org/10.1111/1759-3441.12294

Yalcin, G., Lim, S., Puntoni, S., & van Osselaer, S. M. J. (2022). Thumbs up or down: Consumer reactions to decisions by algorithms versus humans. *Journal of Marketing Research, 59*(4), 696-717. https://doi.org/10.1177/00222437211070016

Zhu, M., Yang, Y., & Hsee, C. K. (2018). The mere urgency effect. *Journal of Consumer Research, 45*(3), 673-690. https://doi.org/10.1093/jcr/ucy008