Journal of Perceptual Imaging® 8: 1–4, 2025.

Remote Research in Cognition and Perception

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Abstract. *A collection of articles on remote research in cognition and perception using the Internet for the Journal of Perceptual Imaging is presented. Four original articles cover the topics of exact versus conceptual replication of cognitive effects (e.g., mental accounting), effects of facial cues on the perception of avatars, cultural influences on perceptual image and video quality assessment, and how Internet habits influence social cognition and social cognitive research. The essentials of these articles are summarized here, and their contributions are embedded within a wider view and historical perspective on remote research in cognition and perception using the Internet.*
Keywords: *remote research, internet-based research, internet-based experiments, iScience, cognition, perception*

[DOI: 10.2352/J.Percept.Imaging.2025.8.000101]

1. REMOTE RESEARCH IN COGNITION AND PERCEPTION

It is with great pleasure that we present and introduce this special issue of the Journal of Perceptual Imaging on remote research in cognition and perception using the Internet. As the reader will see, the featured articles present experimental work and methodology on replication, perception of avatars, perceptual image and video quality assessments, and how Internet use has reshaped social cognition as well as other topics relevant to interdisciplinary empirical research. Readers will find suggestions from different research areas in cognition and perception on how to best employ remote research methodology that follows up on earlier work (e.g., [1, 7, 11, 15, 23, 25, 28]), including special issues in Experimental Psychology [29], in the Journal of Ethnic and Migration Studies [17], and in the Zeitschrift für Psychologie [27].

Advancements in remote research have occurred in different aspects influenced by the Internet, such as technology, methodology, and co-presence, and new issues have been introduced, such as sampling biases via technology preferences [3, 25] or low attention and compliance [18]. Since the earliest reports of demonstrations [33] and true experimental research over the Web [11, 21], its many advantages have caught on quickly. Crowdsourcing, for example, is one of the distinct advancements of the Internet that can drive research to new frontiers ([4]; see also the article [31] in this issue). Remote virtual reality experiments can now be conducted inexpensively in the field [20]. Some early hopes, such as benefits of remote research for increasing the amount, diversity and segmentation of participants compared with in-lab studies, however, have not materialized on a wide scale yet [34]. Therefore, more research and development is needed.

The reader will learn from this special issue about new Internet-based methods, perspectives, design, theory, tools, and technologies that utilize remote research methods. The current collection will help in thinking about and planning of optimal practices for integrating and comparing lab and remote data collection procedures.

Best practices consider both fundamental truths, for example, taking into account that the aims of the companies that develop Web browsers may not align with the aims of science [6] and that measurements on technological devices such as smartphones unavoidably vary [13]. Researchers thus will have to dynamically adjust to the ever-changing Internet technologies. Although there have been and still are many efforts in teaching Web methodologies through workshops, advanced training institutes, summer schools [2 and https://tinyurl.com/6thsummerschool], and tools that implement best practices and nudge users towards following them [26], the need for educating researchers in the essentials of remote research remains an urgent task [12].

Perception has long been studied via the Internet even though it does not lend itself to the medium as easily as research in cognition [24]. Early on, research showed that perception can be studied remotely [10, 11, 14, 30], even in developmental science (e.g., [5]). Perception research in the current special issue was inspired by developments in digital media and thus not only is it concerned with basic perception research but also tries to solve applied issues that have developed as a result of the use of digital media. The following sections of this editorial summarize these articles—Shevchenko et al. [32] and Saupe and Del Pin [31]—followed by two articles that report research on methodology and (social) cognition—Miccoli and Reips [16] and Kim, Gygax, and Gabriel [9].

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Published online Aug. 21, 2025.
2575-8144/2025/8/000101/4/$00.00

2. THE ARTICLES

Following this editorial, the present special issue contains four original articles that are summarized in this section. The first two of the articles consider remote research in perception and the final two describe research in cognition.

2.1 *Facial Cues in Avatars [32]*

The article contributed by Yury Shevchenko, Jakob Heisenstein, and Ulf-Dietrich Reips [32] titled "How do avatars make a positive impression: The effect of facial cues on avatar evaluation" investigates the influence of specific facial features, namely, eye size, jaw shape, and hairstyles on human participants' perception of static avatars.

Following the lead of previous human face and avatar perception literature, the authors are interested in participants' perception of attractiveness, trustworthiness, and personality characteristics, such as perceived sympathy, hostility, and dominance. The rationale behind this investigation is that better understanding and quantifying users' perception of features like "trustworthiness" would be relevant to the design of automated systems and would inform developing technologies concerning the willingness of users to interact with avatars in, for example, user interfaces created for AI systems in financial banking or insurance sectors; virtual applications in which the sharing of confidential information is required; and other virtual e-commerce and gaming environments. Thus, the studies investigate an optimization challenge that is central to the effective design and use of automated systems.

The work systematically manipulates facial feature parameters by varying the size of avatar eyes and the shape of avatar jawlines as well as altering hairstyles on a dimension of plain ("neat") to stylish ("spiky"). Avatar gender is also assessed as avatars were evaluated in both male and female forms, and interactions between assessed factors are examined. Results based on participants' interactions with avatars whose features were systematically manipulated support three hypotheses proposed by the authors. Namely, participant data revealed that large eyes yield a more positive reaction, square jawlines yield higher impressions of dominance, and stylish hair is linked to higher impressions of creativity.

The implications of this research inform the creation and use of avatars, and make significant steps towards forming "best practices" for a wide range of user interfaces that aim to employ avatars in virtual environments in which human users engage with AI assistants for the purposes of information gathering and collaboration.

2.2 *Cultural Influences on Perceptual Image and Video Quality Assessment [31]*

The article contributed by Dietmar Saupe and Simon Hviid Del Pin [31] titled "Uncovering cultural influences on perceptual image and video quality assessment through adaptive quantized metric models" delves into the study of national differences in perceptual image and video quality assessments using advanced statistical models on large-scale crowdsourced datasets. The article presents a compelling exploration of how national differences influence perceptual assessments of image and video quality by using large-scale crowdsourced datasets and advanced statistical models, which combine into a significant contribution to the understanding of global perception variations in media quality.

The research employs methodological rigor, in the form of both frequentist and Bayesian approaches, to uncover country-specific nuances in quality evaluations. The study highlights significant cultural variations, particularly contrasting responses from Japan and the United States, underscoring the importance of cultural context in interpreting rating scales like Absolute Category Rating and Degradation Category Rating. By integrating complex statistical models and considering factors such as lapse rates and quantized metrics, the work contributes a novel perspective to cross-cultural multimedia studies.

The innovative findings presented not only enhance the understanding of global perception variations but also suggest practical implications for improving quality assessment methodologies in industries like video streaming. The article is notable for its substantial methodological and substantive contributions, advancing the discourse on cultural influences in media quality assessments.

2.3 *Internet-Based Research and Replicability [16]*

The article contributed by Maria Rosa Miccoli and Ulf-Dietrich Reips [16] titled "Exact versus conceptual replication: Internet-based research investigating the replicability of cognitive effects" investigates the usefulness of Internet-based experiments as replication studies, for both laboratory-based and online research, by comparing empirical research results from studies conducted through remote empirical research platforms. The article presents analyses that distinguish the subtleties between exact and conceptual replications using experiments that focus on examining the mental accounting effect [8]. In the experiments presented, they directly investigate exact empirical replication (Experiment 1, N: 410) and assess chronological cultural shifts while examining conceptual replications (Experiments 2 and 3, Ns respectively: 270, 365).

Conceptual replications address the need to adapt to historical changes, which happen even to very basic and economical facts like the value of money. Failing to do so (as required in an exact replication to the letter) results in a much smaller effect, as they show in Experiment 1. The authors then adapt the $10 price used in the original experiment to the current value of money, which is more than fourfold. The two conceptual replications show effects of increased size that are more comparable to the original findings.

Through this research, the authors further identify, unpack, and examine important features inherent in the premises that underlie both replication and comparison of behavioral research findings from laboratory settings with those derived from remote assessment methods. The findings of this research raise important general implications

for Internet-based research investigations and their comparability to lab-based research results.

2.4 *Internet Influence on Social Cognition Research [9]*

In their article, "How Internet habits influence social cognitive research: Theoretical and methodological considerations in the era of social media," Jonathan D. Kim, Pascal Gygax, and Ute Gabriel [9] explore the profound ways Internet use has reshaped social cognition and its implications for research. They argue that the Internet's central role in communication and information processing has redefined cognitive processes like memory, attention, and social interaction. Social media algorithms, they note, amplify biases and create "filter bubbles," influencing users' beliefs and behaviors while fostering polarization. The authors also examine the potential of virtual reality as a tool for controlled social experiments, highlighting both its opportunities and risks. They emphasize that these shifts challenge traditional distinctions between "digital natives" and "digital immigrants" [19], as individual use patterns increasingly shape cognitive profiles.

Methodologically, the article underscores the need for balancing external ("ecological") validity with experimental control in Internet-based research (see also [22, 23]). Although online platforms provide naturalistic settings, they introduce variability due to differences in participants' devices and multitasking behaviors. The authors recommend strategies like purposive sampling, controlling for algorithmic engagement, and leveraging digital laboratories or AI avatars to enhance data quality. They also address challenges in studying group membership online, such as anonymity and misrepresentation, particularly in minority groups. Ultimately, the article provides actionable guidance for researchers to navigate these complexities while advancing the remote study of social cognition in a digitally connected world.

3. CONCLUSION

Two of the four articles in the present collection consider remote research in perception while the other two mainly focus on remote research in cognition. They all vividly demonstrate that remote research is achievable within these domains—applicability and insights clearly are transferable to other domains and beyond. Thus, we hope and are confident that readers will find here much guidance and many ideas regarding opportunities and best practices for their own remote research.

4. OPEN ACCESS

ACKNOWLEDGMENT

We would like to thank our authors, many anonymous reviewers, and JPI's staff and chief editors Bernice E. Rogowitz and Thrasos Pappas for the critical yet warm and thorough support throughout this endeavor by which we hope a lot of future research will be inspired.

REFERENCES

[1] M. H. Birnbaum, "Human research and data collection via the Internet," Annu. Rev. Psychol. **55**, 803–832 (2004).

[2] M. H. Birnbaum, "Advanced training in web-based psychology research: Trends and future directions," Z. für Psychol. **229**, 260–265 (2021).

[3] T. Buchanan and U.-D. Reips, "Platform-dependent biases in online research: Do Mac users really think different?" in *Perspectives on Internet Research: Concepts and Methods (Proc. 4th German Online Research Conf. (GOR)*, edited by K. J. Jonas, P. Breuer, B. Schauenburg, and M. Boos (University of Göttingen, 2001).

[4] P. S. Deshpande, S. Tauber, S. M. Chang, S. Gago, and K. A. Jameson, "Digitizing a large corpus of handwritten documents using crowdsourcing and Cultural Consensus Theory," Int. J. Internet Sci. **11**, 8–32 (2016).

[5] A. Frick, S. Huber, U.-D. Reips, and H. Krist, "Task-specific knowledge of the law of pendulum motion in children and adults," Swiss J. Psychol. **64**, 103–114 (2005) https://psycnet.apa.org/doi/10.1024/1421-0185.64.2.103.

[6] P. Garaizar and U.-D. Reips, "Best practices: Two web browser-based methods for stimulus presentation in behavioral experiments with high resolution timing requirements," Behav. Res. Methods **51**, 1441–1453 (2019).

[7] H. Honing and U.-D. Reips, "Web-based versus lab-based studies: A response to Kendall," Empirical Musicol. Rev. **3**, 73–77 (2008).

[8] D. Kahneman and A. Tversky, "Choices, values, and frames," Am. Psychol. **39**, 341–350 (1984).

[9] J. E. Kim, P. Gygax, and U. Gabriel, "How Internet habits influence social cognitive research: Theoretical and methodological considerations in the era of social media," J. Percept. Imaging **8**, 1–12 (2025).

[10] J. H. Krantz, "Stimulus delivery on the Web: What can be presented when calibration isn't possible," in *Dimensions of Internet Science*, edited by U.-D. Reips and M. Bosnjak (Pabst, Lengerich, 2001), pp. 113–130.

[11] J. H. Krantz, J. Ballard, and J. Scher, "Comparing the results of laboratory and world-wide web samples on the determinants of female attractiveness," Behav. Res. Methods Instrum. Comput. **29**, 264–269 (1997).

[12] J. H. Krantz and U.-D. Reips, "The state of web-based research: A survey and call for inclusion in curricula," Behav. Res. Methods **49**, 1621–1629 (2017).

[13] T. Kuhlmann, P. Garaizar, and U.-D. Reips, "Smartphone sensor accuracy varies from device to device: The case of spatial orientation," Behav. Res. Methods **53**, 22–33 (2021).

[14] B. Laugwitz, "A Web experiment on color harmony principles applied to computer user interface design," in *Dimensions of Internet Science*, edited by U.-D. Reips and M. Bosnjak (Pabst, Lengerich, 2001), pp. 131–145.

[15] Y. Lavin, A. D. Silverstein, and X. Zhang, "Visual experiment on the web," Proc. SPIE **3644**, 278–289 (1999).

[16] M. R. Miccoli and U.-D. Reips, "Exact versus conceptual replication: Internet-based research investigating the replicability of cognitive effects," J. Percept. Imaging **8**, 1–15 (2025).

[17] P. J. Oiarzabal and U.-D. Reips (eds), "Migration and the Internet: Social networking and diasporas [special issue]," J. Ethnic Migration Stud. (JEMS) **38** (2012).

[18] D. M. Oppenheimer, T. Meyvis, and N. Davidenko, "Instructional manipulation checks: Detecting satisficing to increase statistical power," J. Exp. Soc. Psychol. **45**, 867–872 (2009).

[19] M. Prensky, "Digital natives, digital immigrants part 1," On The Horizon **9**, 1–6 (2001).

[20] M. A. Quirós-Ramírez, A. Feineisen, S. Streuber, and U.-D. Reips, "Virtual Reality experiments in the field," PLoS ONE **20**, 0318688 (2025).

[21] U.-D. Reips, "Experimenting in the World Wide Web," *Paper presented at the Society for Computers in Psychology Conf.* (1996).

[22] U.-D. Reips, "The Web Experiment Method: Advantages, disadvantages, and solutions," in *Psychological Experiments on the Internet*, edited by M. H. Birnbaum (Academic Press, San Diego, CA, 2000), pp. 89–118.

[23] U.-D. Reips, "Standards for Internet-based experimenting," Exp. Psychol. **49**, 243–256 (2002).

[24] U.-D. Reips, "Internet experiments: Methods, guidelines, metadata," Human Vision Electron. Imaging XIV **7240**, 724008 (2009).
[25] U.-D. Reips, "Web-based research in psychology: A review," Z. für Psychol. **229**, 198–213 (2021).
[26] U.-D. Reips and M. H. Birnbaum, "Behavioral research and data collection via the Internet," in *The Handbook of Human Factors in Web Design*, edited by K.-P. L. Vu and R. W. Proctor (CRC Press, Mahwah, New Jersey, Erlbaum, 2011), pp. 563–585.
[27] U.-D. Reips and T. Buchanan (eds), "Web-based research in psychology [special issue]," Z. für Psychol. **229** (2021). https://econtent.hogrefe.com/toc/zfp/229/4.
[28] U.-D. Reips, T. Buchanan, J. Krantz, and K. McGraw, "Methodological challenges in the use of the Internet for scientific research: Ten solutions and recommendations," Stud. Psychol. Theor. Prax. **15**, 139–148 (2015).
[29] U.-D. Reips and J. Musch (eds), "Special issue: Internet-based psychological experimenting. [Editorial]," Exp. Psychol. **49**, 241–242 (2002).
[30] A. I. Ruppertsberg, G. Givaty, H. A. H. C. Van Veen, and H. Bülthoff, "Games as research tools for visual perception over the Internet," in *Dimensions of Internet Science*, edited by U.-D. Reips and M. Bosnjak (Pabst, Lengerich, 2001), pp. 147–158.
[31] D. Saupe and S. H. Del Pin, "Uncovering cultural influences on perceptual image and video quality assessment through adaptive quantized metric models," J. Percept. Imaging **8**, 1–13 (2025).
[32] Y. Shevchenko, J. Heisenstein, and U.-D. Reips, "How do avatars make a positive impression: The effect of facial cues on avatar evaluation," J. Percept. Imaging **8**, 1–16 (2025).
[33] N. Welch and J. H. Krantz, "The World-Wide Web as a medium for psychoacoustical demonstrations and experiments: Experience and results," Behav. Res. Methods Instrum. Comput. **28**, 192–196 (1996).
[34] C. R. Wolfe, "Twenty years of Internet-based research at SCiP: A discussion of surviving concepts and new methodologies," Behav. Res. Methods **49**, 1615–1620 (2017).