

COMMENTARY TO HABILITATION THESIS¹

Cross-cultural research on perception and cognition has evolved through several distinct waves. Early comparative work at the intersection of anthropology and psychology (e.g., pictorial depth, classic visual illusions) demonstrated that what looks “basic” in perception is in fact tuned by ecology, technology, and visual conventions. Ecocultural perspectives extended this logic, proposing that subsistence demands and social structure shape habitual attention, with downstream consequences for how people parse scenes, extract relations, and act. In parallel, Gestalt traditions put the whole–part tension at center stage and inspired operationalizations of global vs. local processing (e.g., Navon-type hierarchical stimuli; embedded figures). Modern cross-cultural cognitive science layered on the influential analytic–holistic framework: Western samples often prioritize focal objects, rules, and category membership (analytic tendencies), whereas East Asian samples attend more to relations, context, and field (holistic tendencies). Evidence spans eye-movements in naturalistic scenes, change detection, framed-line judgments, categorization, and causal attribution.

Against this backdrop, my thesis asks a pragmatic question: When do cultural differences in perception and cognition appear, how large are they, what predicts them, and how coherently do different measures converge? I organized eight studies to address four linked aims: 1) Test for cross-cultural differences across a complexity gradient, from minimal perceptual decisions (hierarchical/embedded figures) to overt visual attention in 2D scenes and immersive VR, and to multivariate symbol categorization. 2) Evaluate candidate predictors at two levels: Individual-level social orientation (independence–interdependence / individualism–collectivism) and its psychometrics (factor structure, reliability, invariance). Macro-level country indices (Hofstede, Schwartz) as Level-2 predictors of minimal-task performance. 3) Assess convergence across methods, asking whether “analytic–holistic” behaves like a single metastyle (e.g., hierarchical figures ↔ eye-tracking ↔ symbol categorization) or a bundle of partially independent processes. 4) Strengthen methodological foundations, following best practices for adaptation/equivalence (Study I), or harmonizing protocols.

Design and samples. The thesis combines a methodological review (Study I), two psychometric studies (II–III), and five empirical comparisons (IV–VIII). Across studies, data come primarily from university students in Central Europe and East Asia, with additional groups from the Western Balkans, Türkiye, and Ghana. Aggregating across projects yields >4,000 participants. Study II tested Czech versions of two widely used self-construal / INDCOL instruments, examining factor structure, reliability, and convergent validity. Study III broadened to seven countries, testing the Independent–Interdependent Self Scale (IISS) for cross-national measurement invariance and parsimony. Study VIII administered IISS alongside behavioral tasks (hierarchical figures; symbol categorization).

Study IV. Minimal tasks and RT modeling. A multi-task battery (two hierarchical-figure paradigms; an embedded-figures variant) was run in lab and online (N≈993; 12 cultural groups). Analyses included accuracy, RT summaries, and distribution-aware modeling (e.g., diffusion/accumulation-informed summaries), with multilevel models specifying participant random effects and country random intercepts. Country-level culture scores (Hofstede/Schwartz) were added as Level-2 predictors and in cross-level interactions with task conditions (e.g., global vs. local targets).

¹ The commentary must correspond to standard expectations in the field and must include a brief characteristic of the investigated matter, objectives of the work, employed methodologies, obtained results and, in case of co-authored works, a passage characterising the applicant’s contribution in terms of both quality and content.

Studies V–VI. 2D eye-tracking. Study V: Czech vs. Taiwanese students (N=129) freely viewed complex photographs with segmentations into focal objects and background; we indexed fixation counts and dwell time by area of interest (AOI). Study VI: Conceptual replication/extension to seven cultural samples (N=408) under a harmonized protocol and broader stimulus set. Study VII. 3D immersive VR eye-tracking. Five cultural groups (N=242) freely viewed 3D scenes; we manipulated object distance (near vs. far) and recorded gaze allocation to focal vs. contextual content in an ecologically richer environment.

Symbol categorization (VIII). Czech vs. Chinese/Taiwanese respondents (N=103) performed multivariate map-symbol categorization, a task that invites either rule-based, one-dimension (analytic) strategies or similarity-based, integrative (holistic) strategies, alongside a hierarchical-figures measure.

Across empirical studies, we harmonized instructions and timing where feasible, monitored data quality (e.g., ET calibration, trial inclusion), and used model-based statistics (multilevel, distribution-aware RT treatments) to avoid common pitfalls of mean-only summaries.

Several conclusions can be drawn from the results of the presented studies. 1) Differences are real - but selective, metric-specific, and context-dependent. Minimal tasks (Study IV). We observed statistically reliable between-country variance, yet the pattern did not align cleanly with a simple “East = holistic / West = analytic” narrative. Country rank-orders were task-specific; effects that appeared on accuracy sometimes weakened or vanished when examined in RT dynamics and vice versa. Mixing lab and online settings increased heterogeneity but did not produce a single setting-driven reversal. 2D eye-tracking (Studies V–VI). In Study V, Czech participants made more fixations on focal objects, while Taiwanese participants showed greater dwell time on background—an object–context split that is metric-specific, not monolithic. Study VI replicated the general pattern with seven cultural samples: Taiwanese observers devoted less attention to focal objects relative to several other groups; Ghana and Türkiye often showed the most analytic allocation by our indices; Central European groups did not uniformly diverge from Taiwan on all metrics. Demographics explained little of the variance. 3D VR eye-tracking (Study VII). The object–context pattern generalized to immersive 3D. Taiwanese participants again allocated less gaze to focal objects; one Turkish group showed the most analytic pattern, with additional depth (near-object) effects; Czech and Ghana groups typically fell between. The VR context increased ecological validity without erasing group differences. Symbol categorization (VIII). Hierarchical figures showed no significant group difference here, but multivariate map-symbol categorization did: Czech students employed more analytic categorization than Chinese/Taiwanese students. The task’s structure (rule-based vs. similarity-based strategies) offers a plausible mechanism for why group differences surface on categorization even when hierarchical-figure effects are small. In summary, cultural differences emerge reliably in overt attention (2D/VR) and some categorization contexts, but they are not universal across all minimal tasks, settings, or indices. The field benefits from specifying which tasks and which metrics carry the cultural signal.

2) Convergence across measures is limited; “analytic–holistic” is not a single metastyle. Within-person links are modest. In Study V, hierarchical-figures performance did not track ET object–background metrics. In Study IV, latent-profile explorations did not recover a single style organizing individuals (or countries) on one analytic–holistic continuum. Study VIII did find that more local global–local processing predicted more analytic symbol categorization, but this was a selective link, not a general rule. In summary, what we often call “analytic–holistic” looks more like a family of partially coupled mechanisms (attentional breadth, object–context binding, rule use, decision thresholds) than a unitary trait. Expecting strong cross-task correlations is therefore unwarranted.

3) Popular predictors travel unevenly. Self-construal / INDCOL (Studies II–III, VIII). In Czechia (II), both an adapted INDCOL and a widely used self-construal scale showed suboptimal factor structures and weak convergent validity; in the Western Balkans (III), IISS required substantial item reduction and still failed to support robust cross-national invariance (Czechia had to be excluded from invariance testing). When used as predictors (VIII), self-construal scores showed only modest links to behavior and did not consistently discriminate between national groups (e.g., interdependence). Macro-indices (IV). Hofstede and Schwartz scores produced occasional associations with global–local outcomes, but no index provided a stable, interpretable predictor across accuracy and RT parameters or across tasks. Effects often attenuated with alternative outcomes or model specifications. In short, macro indices behaved as blunt instruments for predicting fine-grained perceptual decisions. In summary, before leaning on questionnaire or macro indices to “explain” cognitive differences, we need psychometrically sound, behavior-proximal predictors and models that respect the multi-component nature of analytic–holistic phenomena.

[1]² Čeněk, J., & Urbánek, T. (2019). Adaptace a ekvivalence testových metod: Inspirace pro psychologické testování minorit v ČR. *Československá psychologie*, 63(1). [The adaptation and equivalence of test methods: An inspiration for psychological assessment of minorities in the Czech Republic]

Experimental work (%)	Supervision (%)	Manuscript (%)	Research direction (%)
Not applicable	90	90	90

[2] Lacko, D., Čeněk, J., & Urbánek, T. (2021). Psychometric properties of the independent and interdependent self-construal questionnaire: Evidence from the Czech Republic. *Frontiers in psychology*, 12, 564011. <https://doi.org/10.3389/fpsyg.2021.564011>

Experimental work (%)	Supervision (%)	Manuscript (%)	Research direction (%)
50	70	40	50

[3] Lacko, D., Čeněk, J., Točík, J., Avsec, A., Đorđević, V., Genc, A., ... & Subotić, S. (2022). The necessity of testing measurement invariance in cross-cultural research: Potential bias in cross-cultural comparisons with individualism–collectivism self-report scales. *Cross-Cultural Research*, 56(2-3), 228-267. <https://doi.org/10.1177/10693971211068971>

Experimental work (%)	Supervision (%)	Manuscript (%)	Research direction (%)
30	90	30	70

[4] Lacko, D., Čeněk, J., Arıkan, A., Dresler, T., Galang, A. J., Stachoň, Z., ... & Šařinka, Č. (2024). Investigating the geography of thought across 11 countries: Cross-cultural

² Bibliographic record of a published scientific result, which is part of the habilitation thesis.

differences in analytic and holistic cognitive styles using simple perceptual tasks and reaction time modeling. *Journal of Experimental Psychology: General*, 154(2), 325–346. <https://doi.org/10.1037/xge0001685>

Experimental work (%)	Supervision (%)	Manuscript (%)	Research direction (%)
25	20	20	20

[5] Čeněk, J., Tsai, J. L., & Šašinka, Č. (2020). Cultural variations in global and local attention and eye-movement patterns during the perception of complex visual scenes: Comparison of Czech and Taiwanese university students. *Plos one*, 15(11), e0242501. <https://doi.org/10.1371/journal.Pone.0242501>

Experimental work (%)	Supervision (%)	Manuscript (%)	Research direction (%)
75	50	85	75

[6] Čeněk, J., Halámková, D., Caha, J., Lacko, D., Kalenská, P., Stachoň, Z., ... & Šašinka, Č. (2025). Cross-cultural analysis of eye-movement patterns in visual scene perception: a comparison of seven cultural samples. *Scientific Reports*, 15(1), 28574. <https://doi.org/10.1038/s41598-025-12724-x>

Experimental work (%)	Supervision (%)	Manuscript (%)	Research direction (%)
70	60	85	85

[7] Šašinková, A., Čeněk, J., Ugwitz, P., Tsai, J. L., Giannopoulos, I., Lacko, D., ... & Šašinka, Č. (2023). Exploring cross-cultural variations in visual attention patterns inside and outside national borders using immersive virtual reality. *Scientific Reports*, 13(1), 18852. <https://doi.org/10.1038/s41598-023-46103-1>

Experimental work (%)	Supervision (%)	Manuscript (%)	Research direction (%)
60	40	75	40

[8] Lacko, D., Šašinka, Č., Čeněk, J., Stachoň, Z., & Lu, W. L. (2020). Cross-cultural differences in cognitive style, individualism/collectivism and map reading between Central European and East Asian University students. *Studia Psychologica*, 62(1), 23-43. <https://doi.org/10.31577/sp.2020.01.789>

Experimental work (%)	Supervision (%)	Manuscript (%)	Research direction (%)
15	15	15	15