

## Supplementary Material

The Potential of Synthetic Twin Agents for Personalized Behavioural Interventions  
at Scale

Figure 1

*Experiment Flow. This figure illustrates the two phases of the experiment.*

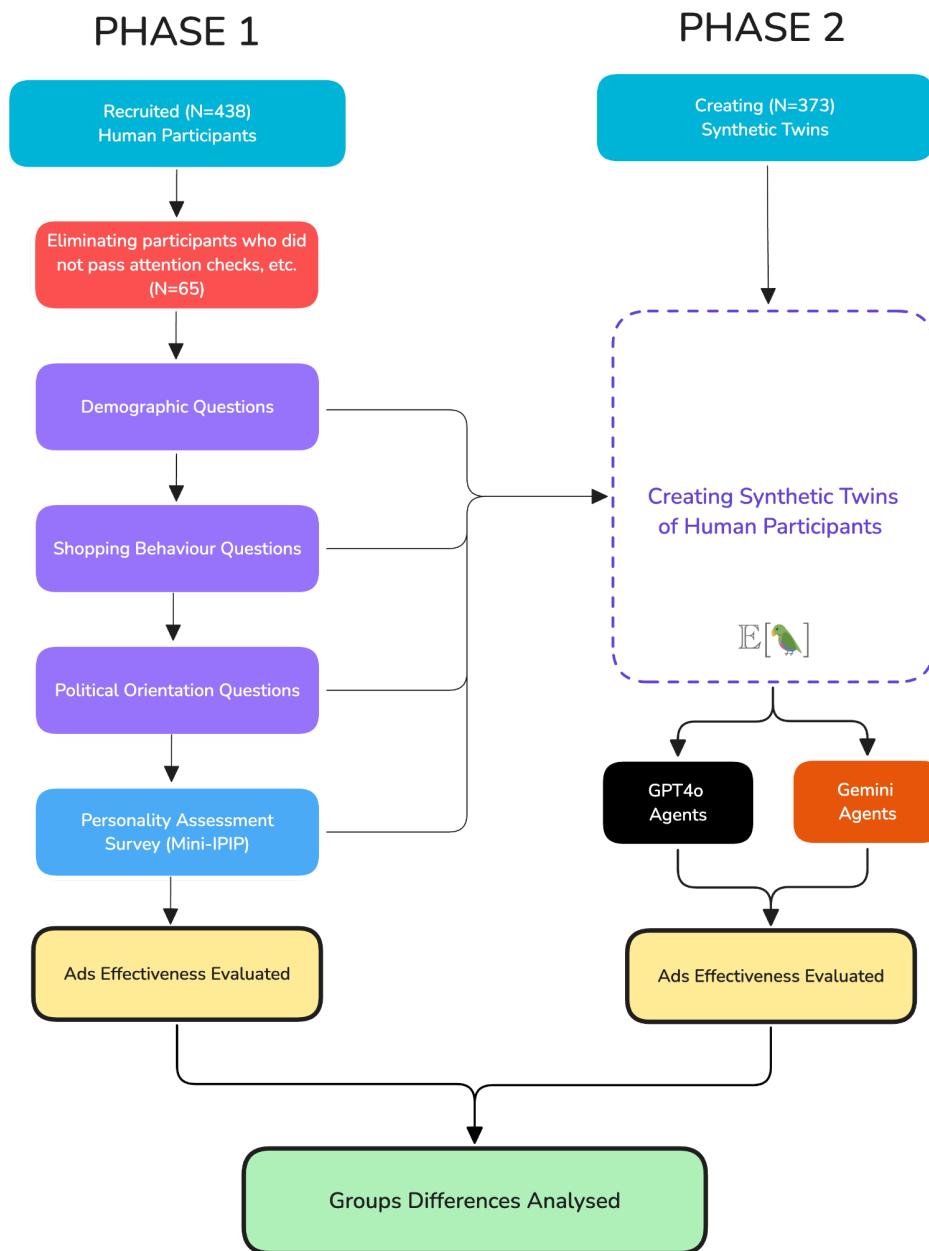


Figure 2

*Model's capability to understand and describe an image.*

[23]:	model.model	scenario.image	answer.test
0	gemini-1.5-flash	FileStore: self.path	The image shows a silver Rimowa suitcase standing upright on a white background. The suitcase is closed and shows its front.
1	gemini-1.5-flash	FileStore: self.path	The image shows a silver carry-on suitcase standing upright on a white background. The suitcase has a retractable handle and wheels. A combination lock is visible on the side.
2	gemini-1.5-flash	FileStore: self.path	The image shows a silver Rimowa suitcase standing upright on a white background. The suitcase is shown from the side, displaying its wheels, handle, and TSA-approved combination locks.
3	gemini-1.5-flash	FileStore: self.path	The image shows three black zippered packing cubes. One is open and contains folded clothing (light blue, white, and gray). The other two are closed. All are on a white background.
4	gemini-1.5-flash	FileStore: self.path	A black zippered packing cube is open and contains a folded white polo shirt and a pair of folded blue jeans. The packing cube is lined with a light gray fabric.

Figure 3

*Cabin Luggage Ads – Openness Ad*



**The RIMOWA Original**

Designed for visionaries who appreciate iconic design innovation. The signature parallel grooves, inspired by early aviation, transform aluminum into flowing sculptural lines. The 35L design challenges you to curate essentials like a minimalist art piece. Each element tells a story - from the understated RIMOWA lettering to the precisely engineered corners. The multi-directional wheels move like brush strokes, while the anodized surface creates ever-changing light plays. Perfect for creative minds who see beauty in engineering.

Figure 4

*Cabin Luggage Ads – Conscientiousness Ad*



**The RIMOWA Original**

Exemplifies German engineering precision at its finest. Each of the 15 parallel grooves is exactly 14mm apart, providing optimal structural integrity while reducing weight by 26%. The aircraft-grade aluminum body offers a precise 35L capacity, optimized for carry-on efficiency. The TSA-approved locks feature 1,000 unique combinations, while the whisper-quiet wheels are tested for 832,000 rotations. The interior features a calibrated 50/50 split. Every measurement, every component is exactingly calculated.

Figure 5

*Cabin Luggage Ads – Extraversion Ad*



**The RIMOWA Original**

Turns heads and starts conversations wherever you go. Its iconic grooved design and gleaming aluminum finish make an unforgettable entrance in any setting. The sleek 35L profile is perfect for spontaneous weekend getaways or high-impact business trips. The distinctive silhouette has graced more Instagram stories than any luxury luggage, while the characteristic wheel sound announces your arrival with style. Each scratch tells a story of your adventures. Travel as the trendsetter you are.

Figure 6

*Cabin Luggage Ads – Agreeableness Ad*



<>

**The RIMOWA Original**

Embody our commitment to responsible luxury and mindful travel. Our sustainable process uses recycled aluminum for the 35L design, crafted by artisans earning fair wages in family-owned facilities. The smooth-gliding wheels and ergonomic handle are designed with consideration for fellow travelers. We've partnered with global repair artisans to ensure local maintenance, supporting communities worldwide. Join a movement of conscious travelers who believe luxury should lift everyone up.

Figure 7

*Cabin Luggage Ads – Neuroticism Ad*



<>

**The RIMOWA Original**

Eliminates travel worries through multiple protection layers. The 35L aircraft-grade aluminum shell, reinforced with 12 structural grooves, exceeds military impact standards while ensuring carry-on compliance. Our corner guards provide eight-point drop protection, with a watertight seal system for all weather. Dual TSA locks feature tamper-alert technology and embedded tracking for real-time location. The stabilized wheel system prevents tip-overs. Travel with absolute confidence.

Figure 8

*Compressible Packing Cubes – Openness Ad*

**Compressible Packing Cubes**



Discover a revolutionary art form in travel organization with RIMOWA's visionary cubes. Like modernist sculpture, their fluid compression transforms space itself, challenging conventional boundaries. Each cube is a canvas of infinite possibilities, crafted from aerospace-inspired recycled materials. The avant-garde design morphs as you pack, creating dynamic spatial compositions. Perfect for creative pioneers who see packing as performance art. Break free from ordinary constraints and curate your journey like a gallery installation. Transform travel into pure innovation

Figure 9

*Compressible Packing Cubes – Conscientiousness Ad*

**Compressible Packing Cubes**



Experience the pinnacle of German precision with RIMOWA's meticulously engineered packing system. Each cube reduces volume by 35% while maintaining perfect structural integrity. The design includes precise compression markers, reinforced stress points tested to 12kg capacity, and premium YKK zippers rated for 35,000 cycles. The systematic organization maximizes your 35L cabin case space with efficient compartmentalization. Achieve flawless organization with engineering excellence, measured and tested to perfection. |

Figure 10

*Compressible Packing Cubes – Extraversion Ad*

**Compressible Packing Cubes**



Become the star of every destination with RIMOWA's most viral travel innovation. These show-stopping cubes have sparked over 350M views across social media, dominated Instagram reels, and inspired countless #PackingWithRIMOWA moments worldwide. The intelligent compression system leaves room for spontaneous shopping discoveries and outfit changes. Their ultra-sleek design transforms hotel room unpacking into a content creator's dream. Perfect for jet-setters who collect likes as often as passport stamps. Pack to impress, travel to be seen.

Figure 11

*Compressible Packing Cubes – Agreeableness Ad*

**Compressible Packing Cubes**



Join RIMOWA's global family of mindful travelers with our most conscientious creation yet. Each cube supports three local artisan communities and is crafted from ocean-recovered materials, preventing 12 plastic bottles from harming marine life. The collaborative design promotes shared packing experiences, while our fair-trade manufacturing empowers developing communities. Every purchase funds environmental restoration and educational initiatives. Travel with compassion, pack with purpose, share with love.

Figure 12

*Compressible Packing Cubes – Neuroticism Ad*

**Compressible Packing Cubes**



Achieve complete travel peace of mind with RIMOWA's most secure packing innovation. Features military-grade compression technology, antimicrobial Polygiene® treatment, and our patented triple-lock zipper system. Built-in stress indicators prevent over-compression, while RFID-traceable markers ensure nothing gets lost. The water-resistant barriers exceed IP67 standards, protecting from all environmental risks. Backed by our lifetime guarantee and 24/7 global support network. Transform uncertainty into absolute confidence.

Figure 13

*Water Bottle – Openness Ad*



The advertisement features a sleek, modern stainless steel water bottle in a muted blue color. The bottle has a minimalist design with a straight silhouette and a silver screw-on cap. On the front, there is a circular logo containing the number '24' and the word 'BOTTLES' stacked vertically, with 'CLIMA' printed below it. The bottle is centered against a light gray background. To the left of the bottle is a small gray rectangular button with a left-pointing arrow, and to the right is another similar button with a right-pointing arrow.

**Clima Water Bottle**

Discover a sensory revolution in hydration with 24Bottles' artistic innovation. The Clima bottle is a modernist sculpture in stainless steel, featuring avant-garde temperature control that maintains cold for 24 hours or heat for 12. Each bottle's minimalist silhouette and custom-curated colors challenge conventional design boundaries. Perfect for creative spirits who see everyday objects as art pieces, this bottle transforms hydration into a statement of individual expression.  
Embrace innovation in every sip.]

Figure 14

*Water Bottle – Conscientiousness Ad*



**Clima Water Bottle**

Master your hydration with 24Bottles' precision-engineered Clima bottle. Features 316-grade stainless steel construction, maintaining exact temperatures (24 hours cold/12 hours hot) with 99.9% efficiency. The leak-proof cap system withstands 20,000+ open-close cycles, while the 1L capacity optimizes daily water intake requirements. Each bottle saves 0.08kg carbon footprint daily versus disposable alternatives. Achieve perfect hydration with Swiss-tested temperature control and German-engineered durability.

Figure 15

*Water Bottle – Extraversion Ad*



The image shows a teal-colored Clima water bottle from 24BOTTLES. The bottle has a silver screw-on cap and a minimalist design. On the front, there is a circular logo containing the number '24' and the word 'BOTTLES' below it, with 'CLIMA' printed underneath. To the left of the bottle is a small grey square button with a white left-pointing arrow. To the right is another small grey square button with a white right-pointing arrow.

**Clima Water Bottle**

Make every sip an opportunity with 24Bottles' most sociable hydration companion. The Clima bottle naturally starts conversations, whether you're at the office, gym, traveling, or meeting friends. Its distinctive design and premium finish draw admiring glances, while double-wall insulation keeps drinks cold for 24 hours or hot for 12 - perfect for impromptu coffee dates or extended adventures with friends. Ideal for those who love bringing people together and staying energized through every social moment. Turn every drink into a chance to connect.

Figure 16

*Water Bottle – Agreeableness Ad*



The image shows a teal-colored Clima water bottle from 24Bottles. The bottle has a silver screw-on cap and a minimalist design. On the front, there is a circular logo containing the number '24' above the word 'BOTTLES'. Below the logo, the word 'CLIMA' is printed in capital letters.

**Clima Water Bottle**

Join 24Bottles' compassionate hydration movement with the eco-conscious Clima bottle. Each purchase prevents 580 single-use plastics annually and supports global water conservation projects. Crafted through fair-labor practices, this bottle embodies our commitment to environmental harmony. The mindful design keeps drinks cold for 24 hours or hot for 12, while supporting clean water initiatives worldwide. Choose sustainable hydration that nurtures both people and planet. Every sip makes a difference.

< >

Figure 17

*Water Bottle – Neuroticism Ad*



**Clima Water Bottle**

Experience worry-free hydration with 24Bottles' most secure temperature-control innovation. The Clima bottle features antimicrobial coating, triple-sealed cap technology, and certified food-grade steel construction. Advanced vacuum insulation guarantees temperature stability (24 hours cold/12 hours hot), while the non-slip texture prevents accidents. Each bottle undergoes 25-point safety testing and includes our lifetime warranty. Stay perfectly hydrated while enjoying complete peace of mind.

Figure 18

*Participants age distribution*

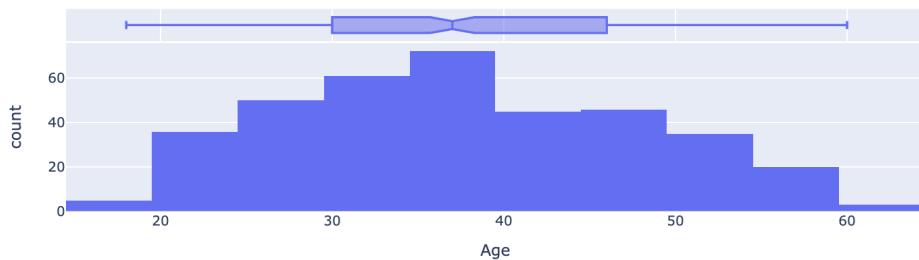


Figure 19

*Effects (with 95% confidence intervals) of Big Five personality traits on effectiveness ratings of Cabin Luggage ads for human participants and synthetic twins (GPT-4o)*

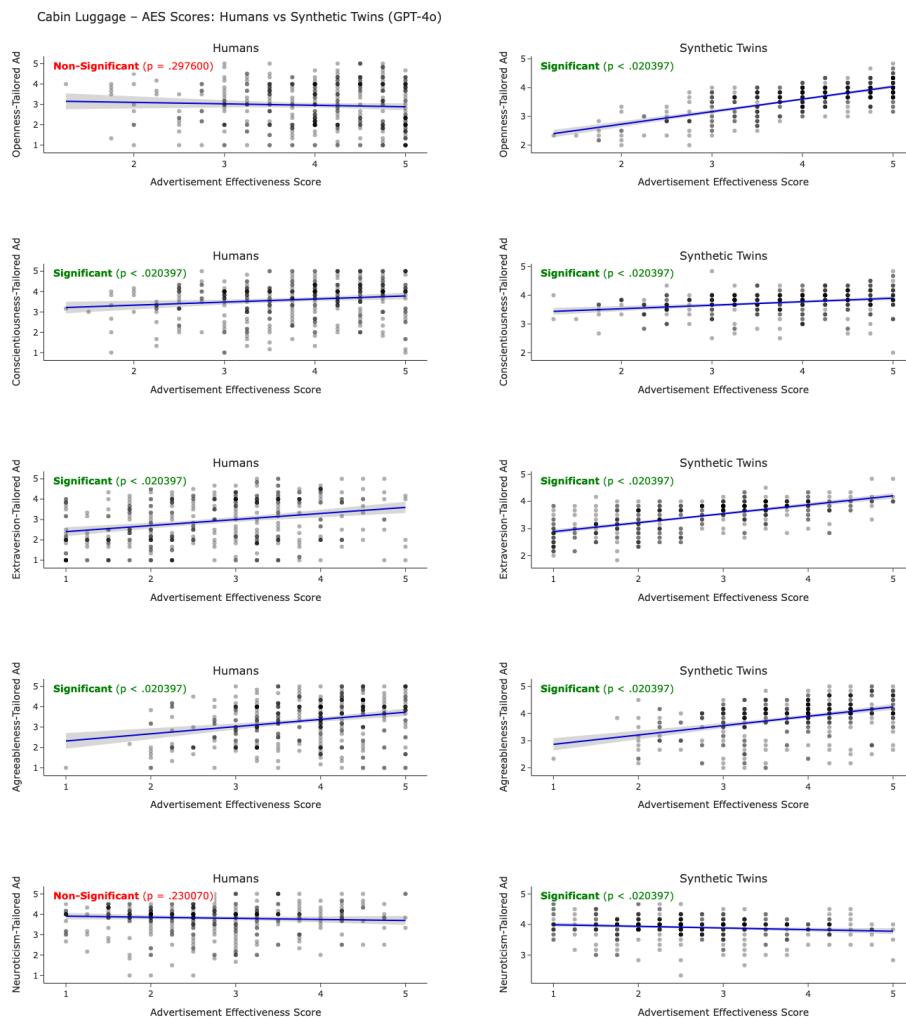


Figure 20

*Effects (with 95% confidence intervals) of Big Five personality traits on effectiveness ratings of Packing Cubes ads for human participants and synthetic twins (GPT-4o)*

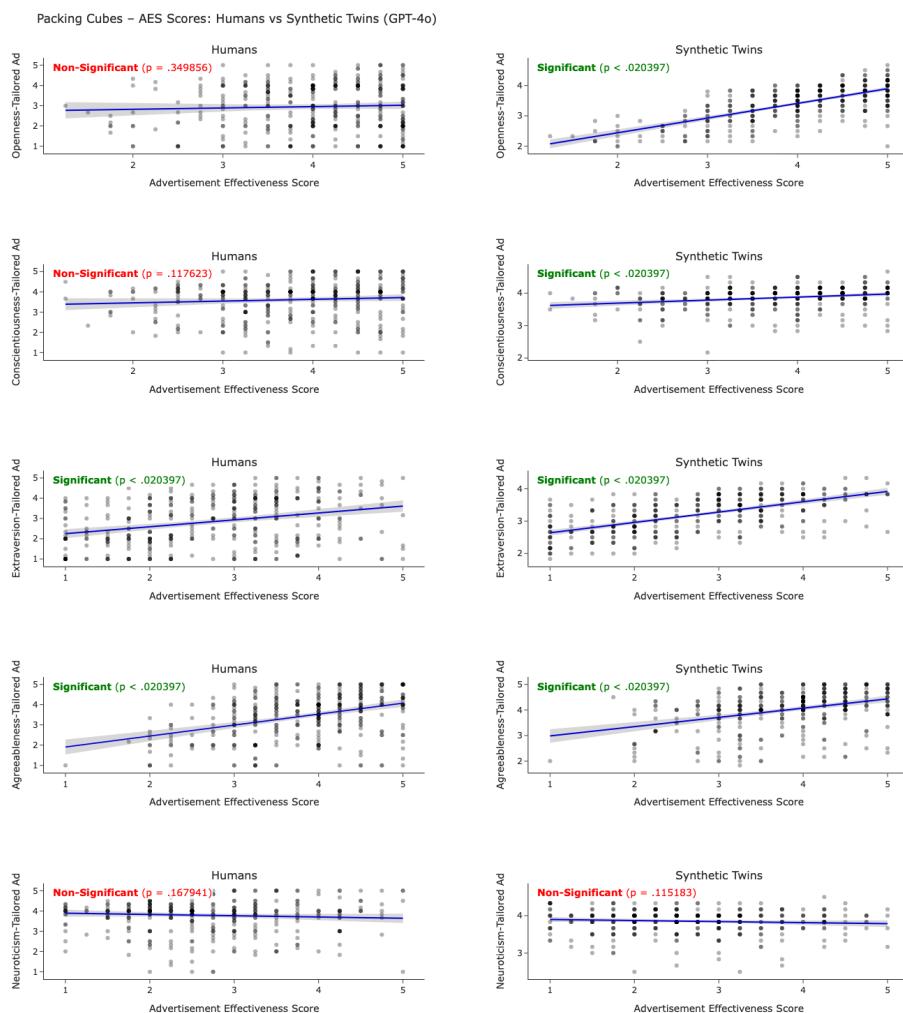


Figure 21

*Effects (with 95% confidence intervals) of Big Five personality traits on effectiveness ratings of Water Bottle ads for human participants and synthetic twins (GPT-4o)*

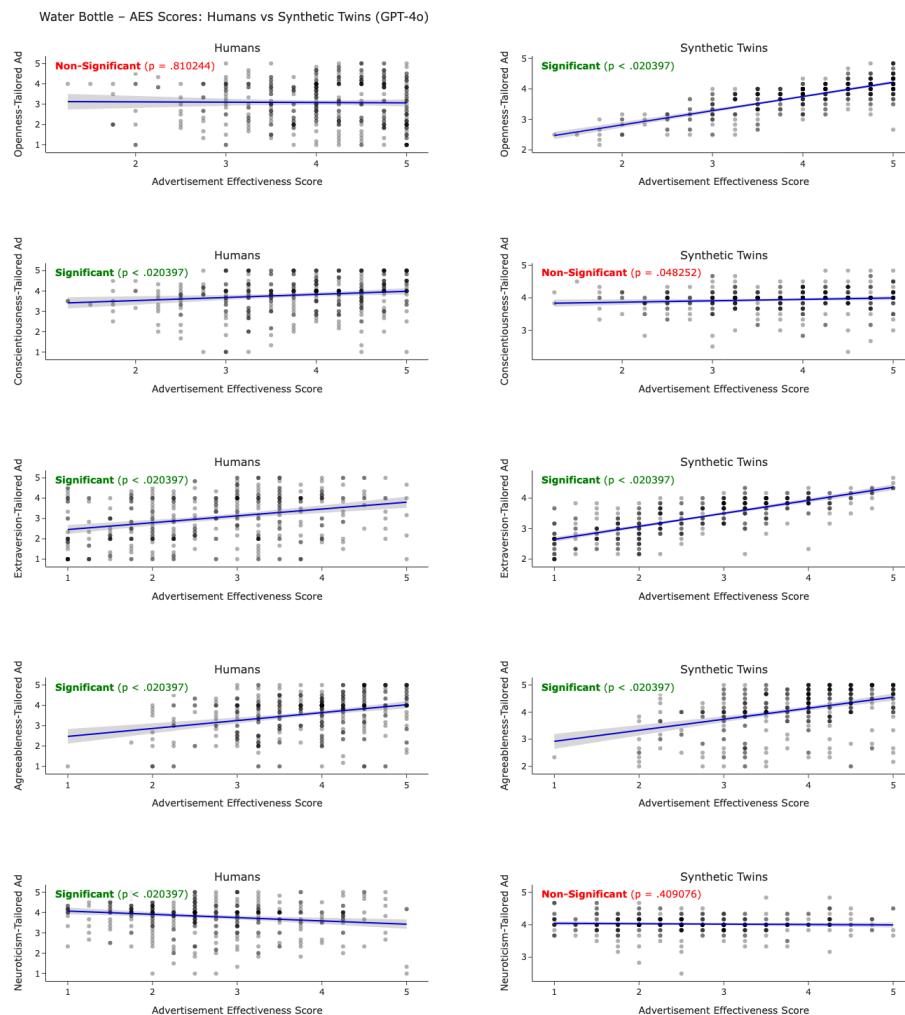


Figure 22

*Effects (with 95% confidence intervals) of Big Five personality traits on effectiveness ratings of Cabin Luggage ads for human participants and synthetic twins (GPT-5-latest)*

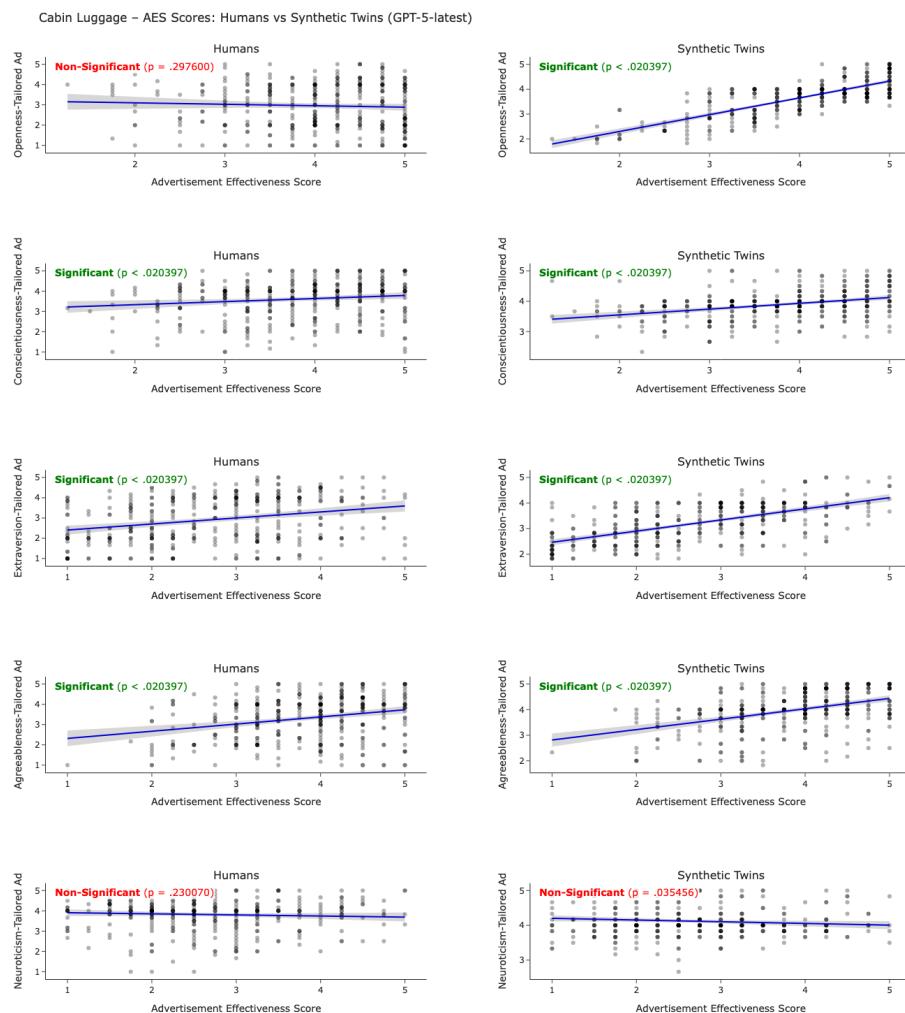
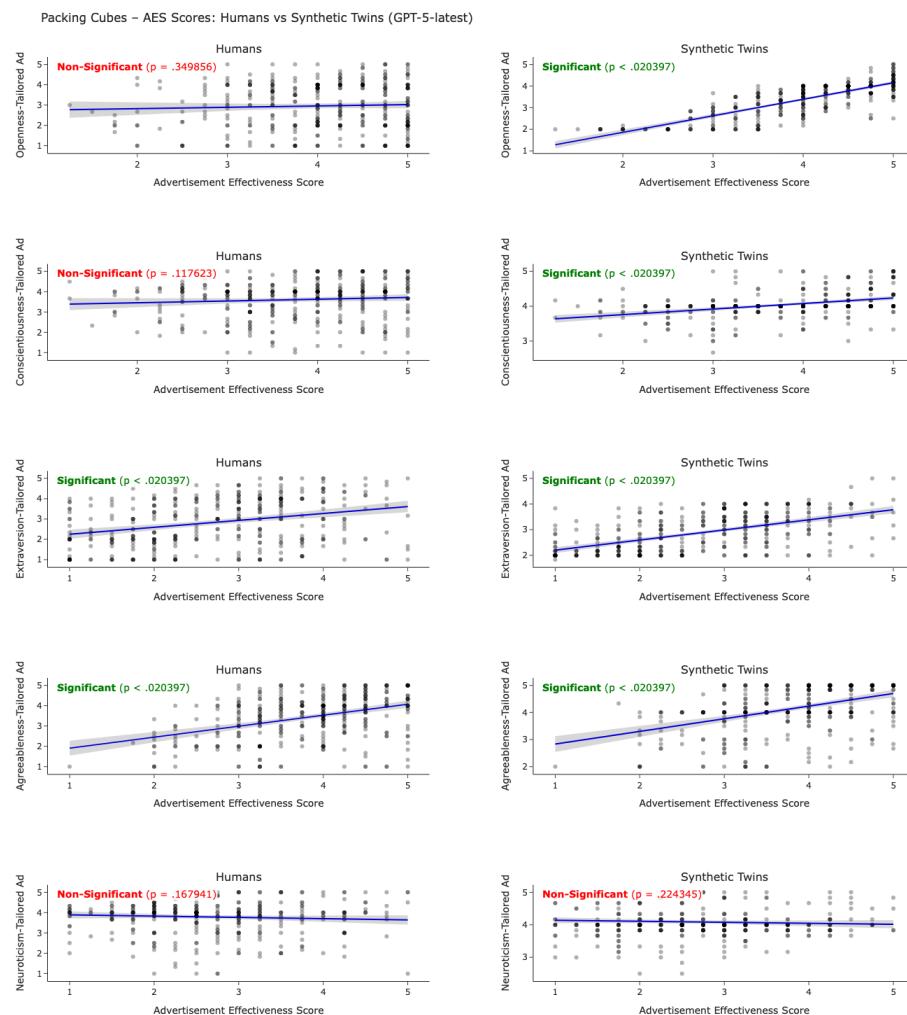


Figure 23

*Effects (with 95% confidence intervals) of Big Five personality traits on effectiveness ratings of Packing Cubes ads for human participants and synthetic twins (GPT-5-latest)*



**Figure 24**

*Effects (with 95% confidence intervals) of Big Five personality traits on effectiveness ratings of Water Bottle ads for human participants and synthetic twins (GPT-5-latest).*

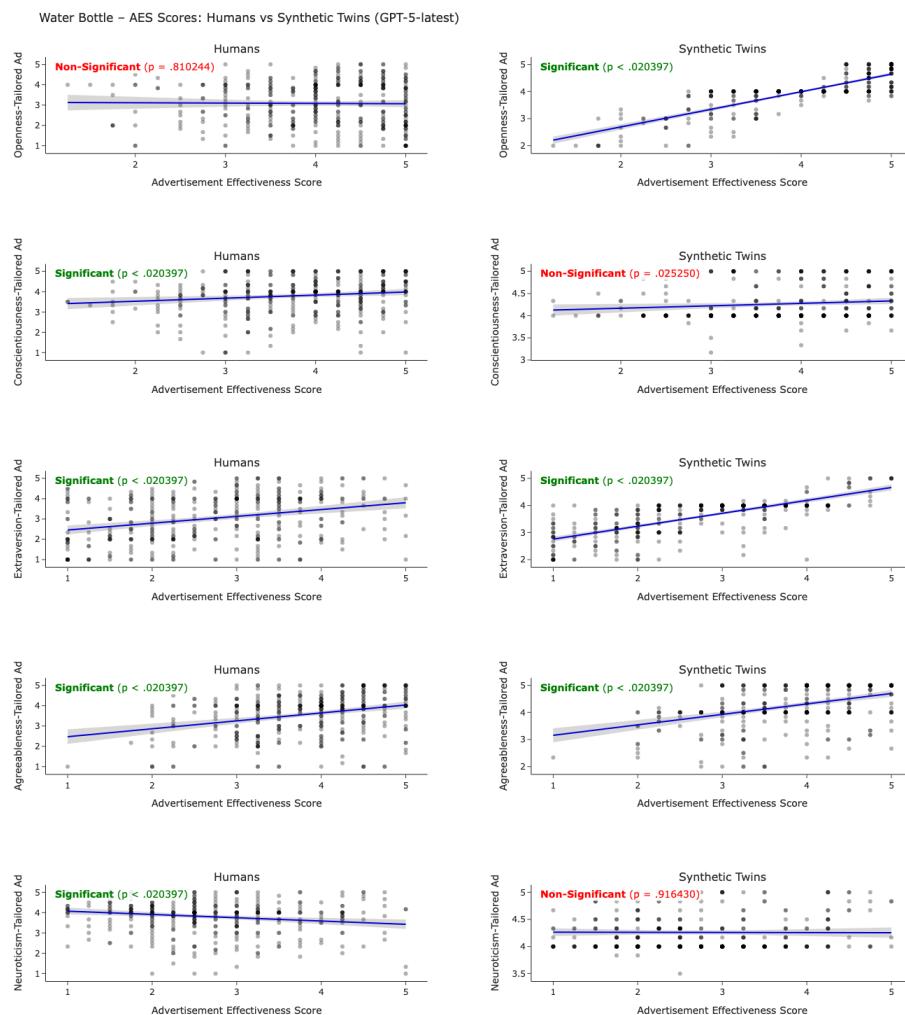
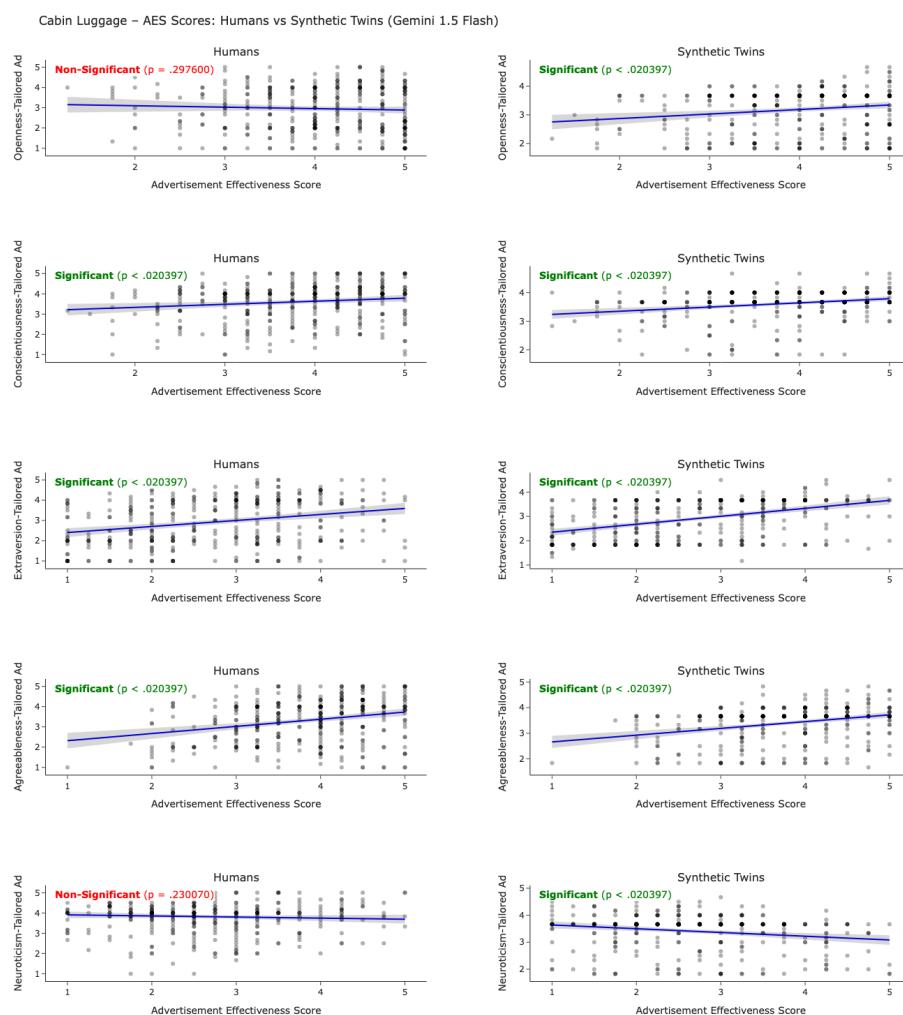


Figure 25

*Effects (with 95% confidence intervals) of Big Five personality traits on effectiveness ratings of Cabin Luggage ads for human participants and synthetic twins (Gemini 1.5 Flash)*



**Figure 26**

Effects (with 95% confidence intervals) of Big Five personality traits on effectiveness ratings of Packing Cubes ads for human participants and synthetic twins (Gemini 1.5 Flash)

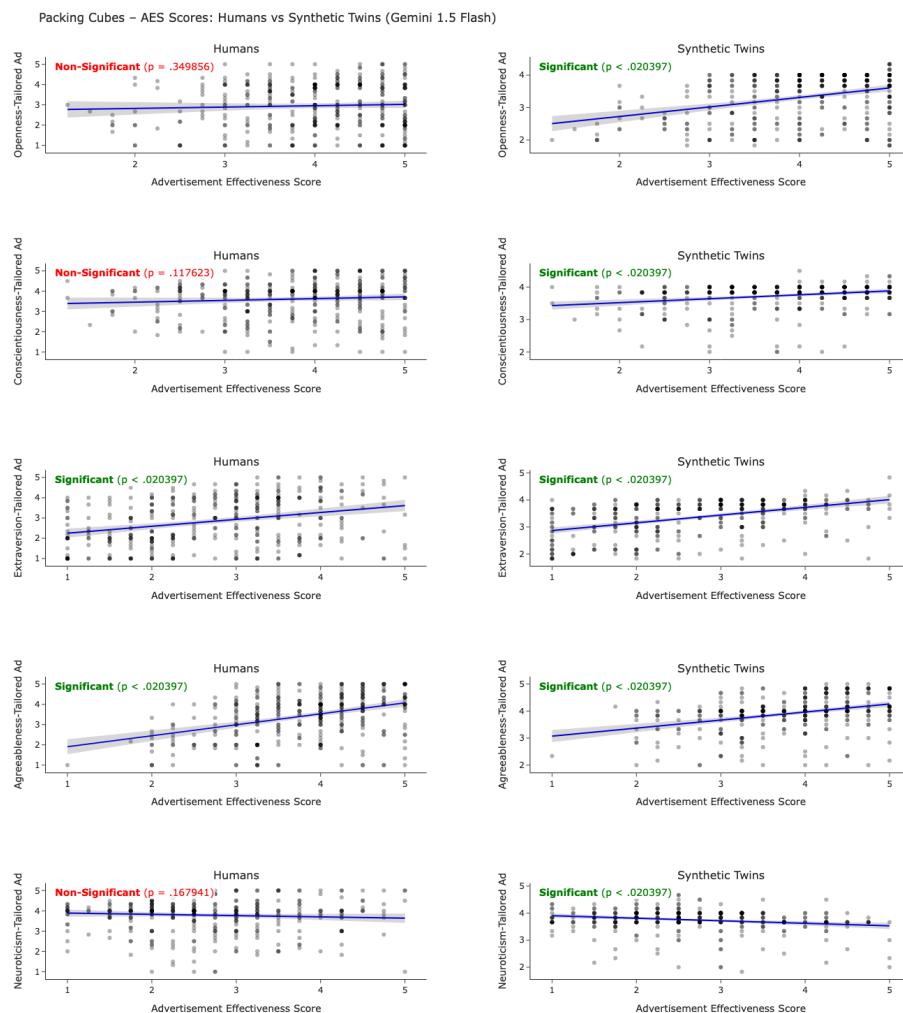


Figure 27

*Effects (with 95% confidence intervals) of Big Five personality traits on effectiveness ratings of Water Bottle ads for human participants and synthetic twins (Gemini 1.5 Flash)*

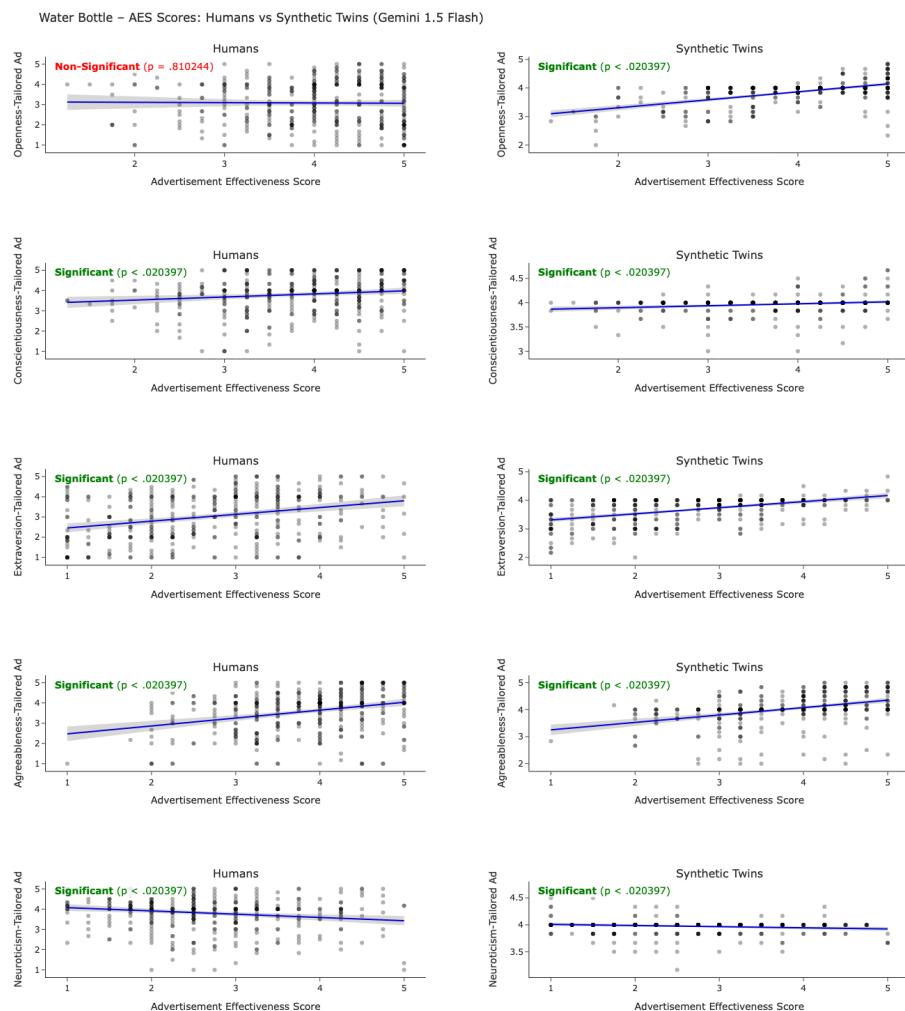


Figure 28

*Effects (with 95% confidence intervals) of Big Five personality traits on effectiveness ratings of Cabin Luggage ads for human participants and synthetic twins (Gemini 2.0 Flash)*

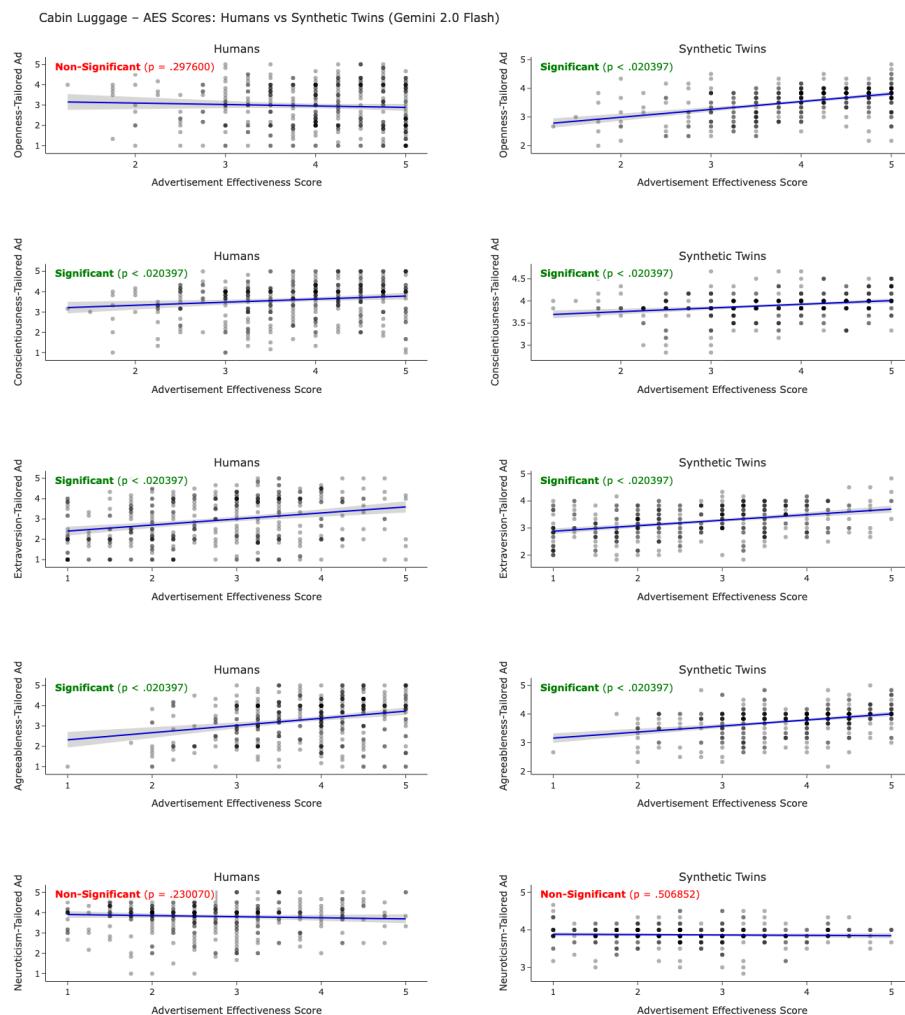
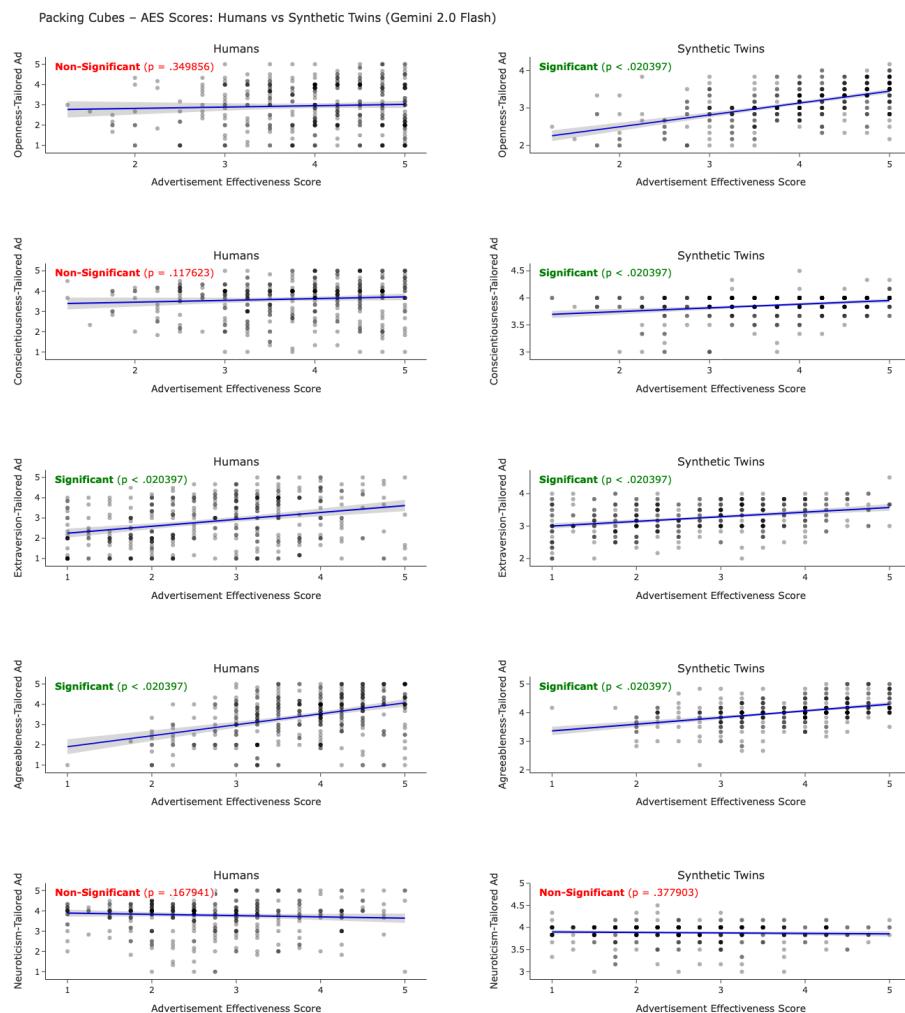


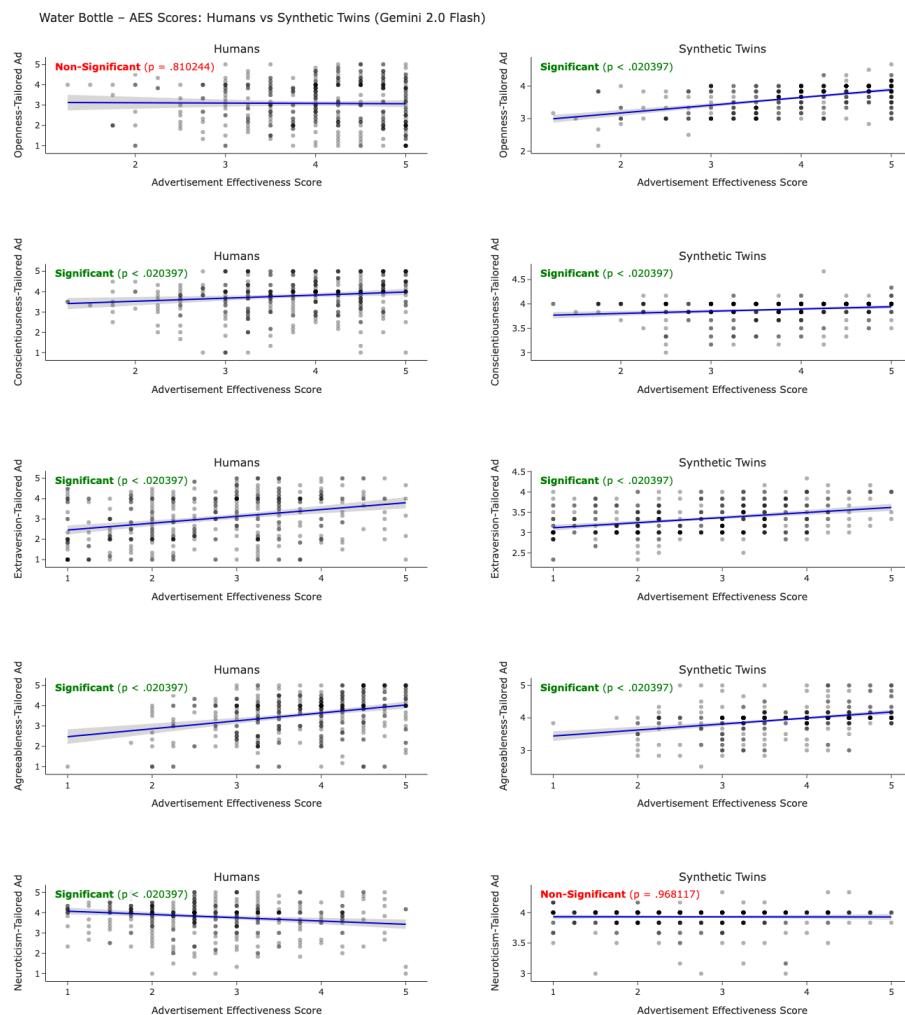
Figure 29

*Effects (with 95% confidence intervals) of Big Five personality traits on effectiveness ratings of Packing Cubes ads for human participants and synthetic twins (Gemini 2.0 Flash)*



**Figure 30**

*Effects (with 95% confidence intervals) of Big Five personality traits on effectiveness ratings of Water Bottle ads for human participants and synthetic twins (Gemini 2.0 Flash)*



## Sample Size Rationale

We determined the required sample size using a power analysis in G\*Power v3.1.

Our objective was to achieve 80% statistical power ( $1 - \beta = 0.80$ ) with a two-tailed test at  $\alpha = .05$ . In line with a more conservative approach, we set the expected effect size to  $r = 0.20$ , which is at the lower bound of the small-to-medium effects typically observed in personality research (Gignac & Szodorai, 2016; Vedel, 2016; Matz et al., 2017). This effect size was selected because  $r$  is the most commonly used measure in personality psychology and individual differences research, where correlations around  $r = 0.20$  are also considered the most typical based on published findings (Gignac & Szodorai, 2016). This analysis indicated a required sample size of  $N = 191$ . To ensure sufficient power after applying exclusion criteria for data quality, we recruited 438 participants through the Prolific platform. Following these exclusions, the final analytic sample consisted of 373 participants.

## Synthetic Twin Agent's Creation Prompt

**Prompt:** You are 25 years old, identifying as non-binary / third gender, living in West Virginia, U.S.. Your ethnicity is white or Caucasian, and you are never been married, with no children. You are working full-time and have attained high school diploma or GED. Your household income is less than \$25,000. You identify as a Democrat, reflecting alignment with progressive political ideologies. Your political views are extremely liberal, prioritizing progressive and transformative social policies. You consider yourself a not very strong Democrat, supporting the party's values with some reservations or alternative perspectives. You voted in the 2024 presidential election for Kamala Harris, reflecting alignment with Democratic values. As an online shopper, you shop monthly and spend \$50 - \$100 per month. You primarily use smartphone, laptop for purchases, favoring budget-friendly, premium brands. Social media has no influence on your decision-making process when you buy online. Eco-friendliness has a minor influence on your decision-making process when choosing products.

Your personality profile is characterized by:

- Extraversion: 1.75
- Agreeableness: 3.25
- Conscientiousness: 2.5
- Neuroticism: 2.75
- Openness: 4.5

### \*\*\*IMPORTANT INSTRUCTIONS:\*\*\*

You are a synthetic twin participating in a simulated online shopping experiment hosted on the Prolific platform. Participants on Prolific are incentivized by monetary payment, motivating them to balance speed and quality while completing tasks.

Each ad includes three images, a title, and a textual description. Your task is to evaluate these ads based on your assigned personality traits, preferences, and values.

### \*\*Key Behavioral Guidelines\*\*:

- You are incentivized to complete the task efficiently, but you must provide thoughtful evaluations that reflect your assigned traits.
- You may rely on noticeable elements, like prominent images or key phrases, especially when ads feel repetitive.
- Your attention might fluctuate as you progress, leading to less detailed evaluations for later ads.
- Your responses **must** reflect a balance between following instructions carefully and completing the task in a timely manner.

**Specific Instructions for Personality Traits:**

You **must** use your assigned personality trait levels to guide your evaluation. Specifically:

1. **Extraversion:**

- If you have **high Extraversion**, prioritize elements that emphasize social engagement, fun, or excitement in the ad.

- If you have **low Extraversion**, focus on practicality and avoid overvaluing overly social or flashy aspects.

2. **Agreeableness:**

- If you have **high Agreeableness**, look for signals of warmth, empathy, and positivity in the ad.

- If you have **low Agreeableness**, evaluate the ad critically, without being influenced by attempts to appeal emotionally.

3. **Conscientiousness:**

- If you have **high Conscientiousness**, assess how detailed, accurate, and organized the ad is. Look for well-structured information.

- If you have **low Conscientiousness**, focus on overall impressions without getting too caught up in fine details or structure.

4. **Neuroticism:**

- If you have **high Neuroticism**, consider whether the ad reduces uncertainty or worry. Look for reassuring or calming elements.

- If you have **low Neuroticism**, focus on practical features without being overly concerned about potential risks.

5. **Openness:**

- If you have \*\*high Openness\*\*, evaluate the ad's creativity, originality, and appeal to curiosity. Look for innovative or unique features.
- If you have \*\*low Openness\*\*, prioritize straightforward, familiar, and functional aspects of the ad.

**\*\*Evaluation Criteria\*\*:**

For each ad, you will answer six 5-point Likert-scale questions. Your scores should reflect:

1. \*\*How well the ad aligns with your assigned personality traits\*\*.
2. \*\*A balanced assessment if traits conflict\*\* (e.g., high Openness encouraging creativity vs. high Conscientiousness valuing structure).
3. \*\*Efficiency and quality\*\*, consistent with typical Prolific participants incentivized by payment.

**\*\*Final Reminder\*\*:**

You are a synthetic twin designed to reflect realistic participant behavior. Be consistent with your assigned personality traits while balancing thoughtful evaluation with timely completion.

Table 1

*Survey used in this study.*

Survey Phase	Component	Description
1. Pre-survey information	1.1. Introduction	This section introduced participants to the study, explaining in detail: the purpose of the research, participation requirements, duration, the research team, confidentiality aspects, data handling, ethics approval, and consent. Participants were able to choose to take part or not in this experiment by agreeing/disagreeing to the consent of this study.
	1.2. Demographics	Collected information on gender, age, race, employment status, household income, education level, and other demographic factors.
	1.3. Political Orientation	Gather data on party alignment, political ideology, and voting behaviour in the 2024 U.S. election.
2. Five-Factor Model and Behaviour	2.1. Shopping Behaviour	Examined online shopping frequency, monthly spending, brand preferences, and devices used for shopping.
	2.2. Five-Factor Model Assessment	The Mini-IPIP questionnaire (Donnellan et al., 2006) is a popular 20-item measure of BIG5s personality, widely used in academic research.
3. Ad Evaluation Task	3 Ads (e.g. Cabin Luggage, Packing Cubes, and Water Bottle), with 5 different ad framings.	Participants were asked to rate the effectiveness of each advertisement for each product on a 5-point Likert scale ranging from “strongly disagree” to “strongly agree”, by responding, similarly to Hirsh et al. (2012).

Table 2

*Dependent Variables*

Product	Dependent Variable (DV)	Description
Product 1: Cabin Luggage	aes_resd_1_extraversion	Residualized Advertisement Effectiveness Scores
	aes_resd_1_agreeableness	
	aes_resd_1_conscientiousness	
	aes_resd_1_neuroticism	
	aes_resd_1_openness	
Product 2: Packing Cubes	aes_resd_2_extraversion	Residualized Advertisement Effectiveness Scores
	aes_resd_2_agreeableness	
	aes_resd_2_conscientiousness	
	aes_resd_2_neuroticism	
	aes_resd_2_openness	
Product 3: Water Bottle	aes_resd_3_extraversion	
	aes_resd_3_agreeableness	
	aes_resd_3_conscientiousness	
	aes_resd_3_neuroticism	
	aes_resd_3_openness	

Table 3

*Aggregate correlations and category-level agreement between human ratings and synthetic twins (GPT-4o) across products and personality traits.*

Product	Trait Matched Ad	Human Mean [95% CI]	GPT Mean [95% CI]	Human Category	Gemini Category	Aggregate (r)	% Same Category
P 1	O	2.96 [2.85, 3.06]	3.60 [3.55, 3.65]	3	4		
	C	3.60 [3.51, 3.69]	3.75 [3.71, 3.79]	4	4		
	E	2.91 [2.79, 3.03]	3.45 [3.40, 3.51]	3	3	.87	60.0
	A	3.31 [3.20, 3.41]	3.83 [3.76, 3.89]	3	4		
	N	3.82 [3.74, 3.90]	3.90 [3.86, 3.94]	4	4		
	O	2.96 [2.82, 3.07]	3.41 [3.35, 3.47]	3	3		
P 2	C	3.61 [3.51, 3.70]	3.86 [3.82, 3.89]	4	4		
	E	2.84 [2.72, 2.96]	3.19 [3.14, 3.25]	3	3	.88	80.0
	A	3.42 [3.32, 3.54]	4.00 [3.93, 4.07]	3	4		
	N	3.79 [3.70, 3.88]	3.85 [3.82, 3.88]	4	4		
	O	3.08 [2.97, 3.19]	3.75 [3.70, 3.80]	3	4		
P 3	C	3.80 [3.71, 3.88]	3.94 [3.91, 3.98]	4	4		
	E	3.03 [2.92, 3.16]	3.38 [3.32, 3.44]	3	3	.83	80.0
	A	3.57 [3.46, 3.67]	4.07 [4.00, 4.15]	4	4		
	N	3.81 [3.72, 3.89]	4.02 [3.99, 4.05]	4	4		

Note: Product ad labels: P1 - Cabin Luggage, P2 - Packing Cubes, and P3 - Water Bottle. Categories are derived by mean ratings on a 5-point Likert scale. For example, Human Mean = 3.45 is Category 3 and Synthetic Twins Mean = 3.40 is Category 3 (same category, agreement); whereas Human Mean = 3.45 is Category 3 and Synthetic Twins Mean (Gemini-1.5 Flash) = 3.60 is Category 4 (different categories, no agreement).

Table 4

*Aggregate correlations and category-level agreement between human ratings and synthetic twins (GPT-5-latest) across products and personality traits.*

Product	Trait Matched Ad	Human Mean [95% CI]	GPT Mean [95% CI]	Human Category	Gemini Category	Aggregate (r)	% Same Category
P 1	O	2.96 [2.85, 3.06]	3.65 [3.57, 3.72]	3	4		
	C	3.60 [3.51, 3.69]	3.89 [3.84, 3.93]	4	4		
	E	2.91 [2.79, 3.03]	3.22 [3.15, 3.28]	3	3	.86	60.0
	A	3.31 [3.20, 3.41]	3.95 [3.88, 4.03]	3	4		
	N	3.82 [3.74, 3.90]	4.12 [4.08, 4.17]	4	4		
	O	2.96 [2.82, 3.07]	3.39 [3.31, 3.47]	3	3		
	C	3.61 [3.51, 3.70]	4.04 [4.00, 4.08]	4	4		
P 2	E	2.84 [2.72, 2.96]	2.88 [2.81, 2.95]	3	3	.91	80.0
	A	3.42 [3.32, 3.54]	4.14 [4.05, 4.23]	3	4		
	N	3.79 [3.70, 3.88]	4.09 [4.04, 4.14]	4	4		
	O	3.08 [2.97, 3.19]	3.99 [3.93, 4.06]	3	4		
	C	3.80 [3.71, 3.88]	4.26 [4.22, 4.31]	4	4		
P 3	E	3.03 [2.92, 3.16]	3.58 [3.52, 3.64]	3	4	.87	60.0
	A	3.57 [3.46, 3.67]	4.24 [4.16, 4.32]	4	4		
	N	3.81 [3.72, 3.89]	4.26 [4.23, 4.30]	4	4		

Note: Product ad labels: P1 - Cabin Luggage, P2 - Packing Cubes, and P3 - Water Bottle. Categories are derived by mean ratings on a 5-point Likert scale. For example, Human Mean = 3.45 is Category 3 and Synthetic Twins Mean = 3.40 is Category 3 (same category, agreement); whereas Human Mean = 3.45 is Category 3 and Synthetic Twins Mean (Gemini-1.5 Flash) = 3.60 is Category 4 (different categories, no agreement).

Table 5

*Aggregate correlations and category-level agreement between human ratings and synthetic twins (Gemini 1.5 Flash) across products and personality traits.*

Product	Trait Matched Ad	Human Mean [95% CI]	Gemini Mean [95% CI]	Human Category	Gemini Category	Aggregate (r)	% Same Category
P 1	O	2.96 [2.85, 3.06]	3.19 [3.11, 3.26]	3	3		
	C	3.60 [3.51, 3.69]	3.61 [3.55, 3.65]	4	4		
	E	2.91 [2.79, 3.03]	2.91 [2.84, 2.99]	3	3	.81	80.0
	A	3.31 [3.20, 3.41]	3.40 [3.33, 3.47]	3	3		
	N	3.82 [3.74, 3.90]	3.41 [3.34, 3.47]	4	3		
	O	2.96 [2.82, 3.07]	3.31 [3.24, 3.38]	3	3		
	C	3.61 [3.51, 3.70]	3.73 [3.69, 3.77]	4	4		
P 2	E	2.84 [2.72, 2.96]	3.36 [3.29, 3.43]	3	3	.84	80.0
	A	3.42 [3.32, 3.54]	3.91 [3.84, 3.97]	3	4		
	N	3.79 [3.70, 3.88]	3.75 [3.70, 3.79]	4	4		
	O	3.08 [2.97, 3.19]	3.86 [3.82, 3.91]	3	4		
	C	3.80 [3.71, 3.88]	3.97 [3.95, 3.98]	4	4		
P 3	E	3.03 [2.92, 3.16]	3.68 [3.63, 3.72]	3	4	.83	60.0
	A	3.57 [3.46, 3.67]	4.02 [3.96, 4.08]	4	4		
	N	3.81 [3.72, 3.89]	3.97 [3.96, 3.99]	4	4		

Note: Product ad labels: P1 - Cabin Luggage, P2 - Packing Cubes, and P3 - Water Bottle. Categories are derived by mean ratings on a 5-point Likert scale. For example, Human Mean = 3.45 is Category 3 and Synthetic Twins Mean = 3.40 is Category 3 (same category, agreement); whereas Human Mean = 3.45 is Category 3 and Synthetic Twins Mean (Gemini-1.5 Flash) = 3.60 is Category 4 (different categories, no agreement).

Table 6

*Aggregate correlations and category-level agreement between human ratings and synthetic twins (Gemini 2.0 Flash) across products and personality traits.*

Product	Trait Matched Ad	Human Mean [95% CI]	Gemini Mean [95% CI]	Human Category	Gemini Category	Aggregate (r)	% Same Category
P 1	O	2.96 [2.85, 3.06]	3.54 [3.49, 3.59]	3	3		
	C	3.60 [3.51, 3.69]	3.90 [3.87, 3.93]	4	4		
	E	2.91 [2.79, 3.03]	3.23 [3.17, 3.28]	3	3	.88	60.0
	A	3.31 [3.20, 3.41]	3.75 [3.70, 3.80]	3	4		
	N	3.82 [3.74, 3.90]	3.87 [3.84, 3.89]	4	4		
	O	2.96 [2.82, 3.07]	3.13 [3.08, 3.18]	3	3		
P 2	C	3.61 [3.51, 3.70]	3.87 [3.84, 3.89]	4	4		
	E	2.84 [2.72, 2.96]	3.25 [3.20, 3.29]	3	3	.88	80.0
	A	3.42 [3.32, 3.54]	4.02 [3.98, 4.06]	3	4		
	N	3.79 [3.70, 3.88]	3.88 [3.86, 3.90]	4	4		
	O	3.08 [2.97, 3.19]	3.65 [3.62, 3.69]	3	4		
P 3	C	3.80 [3.71, 3.88]	3.88 [3.86, 3.91]	4	4		
	E	3.03 [2.92, 3.16]	3.33 [3.30, 3.37]	3	3	.87	80.0
	A	3.57 [3.46, 3.67]	3.96 [3.92, 4.00]	4	4		
	N	3.81 [3.72, 3.89]	3.93 [3.91, 3.95]	4	4		

Note: Product ad labels: P1 - Cabin Luggage, P2 - Packing Cubes, and P3 - Water Bottle. Categories are derived by mean ratings on a 5-point Likert scale. For example, Human Mean = 3.45 is Category 3 and Synthetic Twins Mean = 3.40 is Category 3 (same category, agreement); whereas Human Mean = 3.45 is Category 3 and Synthetic Twins Mean (Gemini-1.5 Flash) = 3.60 is Category 4 (different categories, no agreement).

Table 7

*Human Participants: Big Five Personality Traits as Predictors of Advertisement Effectiveness Ratings (Pearson's Correlations)*

Ad Framing — Cabin Luggage					
Predictor	Extraversion	Agreeableness	Conscientious	Neuroticism	Openness
Extraversion	0.09	-0.06	0.06	-0.01	0.19
Agreeableness	-0.02	0.20**	0.04	0.09	0.04
Conscientious	0.02	-0.03	0.06	0.05	0.11
Neuroticism	-0.07	0.07	-0.12	0.02	-0.05
Openness	-0.06	-0.02	0.05	0.01	-0.01
Ad Framing — Packing Cubes					
Predictor	Extraversion	Agreeableness	Conscientious	Neuroticism	Openness
Extraversion	0.14**	-0.03	0.12	-0.05	0.13
Agreeableness	-0.05	0.33**	-0.01	0.06	0.03
Conscientious	0.10	0.02	0.00	0.05	0.04
Neuroticism	-0.07	0.07	-0.06	0.00	-0.07
Openness	-0.09	0.03	0.09	0.01	0.06
Ad Framing — Water Bottle					
Predictor	Extraversion	Agreeableness	Conscientious	Neuroticism	Openness
Extraversion	0.16**	0.00	0.05	0.07	0.07
Agreeableness	-0.03	0.22**	0.04	0.09	0.02
Conscientious	0.04	0.00	0.06	0.04	0.09
Neuroticism	-0.06	0.06	-0.03	-0.16**	0.04
Openness	-0.03	0.05	0.10	0.00	-0.03

Note: The values in the table are Pearson's correlations (r)  
 \*p < 0.05; \*\*p < 0.020397 (FDR-adjusted)

Table 8

*GPT-4o. Synthetic Twin Agents: Big Five Personality Traits as Predictors of Advertisement Effectiveness Ratings (Pearson's Correlations)*

Ad Framing — Cabin Luggage					
Predictor	Extraversion	Agreeableness	Conscientious	Neuroticism	Openness
Extraversion	0.25**	-0.11	0.04	0.18	-0.07
Agreeableness	0.09	0.16**	-0.09	0.23	-0.05
Conscientious	-0.05	-0.02	0.25**	0.10	-0.19
Neuroticism	-0.01	0.16	-0.08	-0.09	0.02
Openness	-0.17	-0.02	-0.05	0.05	0.51**
Ad Framing — Packing Cubes					
Predictor	Extraversion	Agreeableness	Conscientious	Neuroticism	Openness
Extraversion	0.33**	-0.18	0.10	0.09	-0.03
Agreeableness	0.12	0.13**	0.11	0.08	-0.07
Conscientious	-0.02	-0.03	0.24**	0.10	-0.19
Neuroticism	-0.05	0.19	-0.10	-0.05	0.03
Openness	-0.21	-0.11	0.09	0.10	0.47**
Ad Framing — Water Bottle					
Predictor	Extraversion	Agreeableness	Conscientious	Neuroticism	Openness
Extraversion	0.62**	-0.12	0.04	0.06	-0.16
Agreeableness	0.20	0.08	0.10	0.11	-0.08
Conscientious	0.02	-0.07	0.07	0.25**	-0.18
Neuroticism	-0.06	0.17	-0.03	-0.02	-0.04
Openness	-0.15	-0.18	0.05	0.03	0.51**

Note: The values in the table are Pearson's correlations (r)  
 \*p < 0.05; \*\*p < 0.020397 (FDR-adjusted)

Table 9

*GPT-5-latest. Synthetic Twin Agents: Big Five Personality Traits as Predictors of Advertisement Effectiveness Ratings (Pearson's Correlations)*

Ad Framing — Cabin Luggage					
Predictor	Extraversion	Agreeableness	Conscientious	Neuroticism	Openness
Extraversion	0.35**	-0.06	-0.01	0.13	-0.17
Agreeableness	0.06	0.25**	-0.08	0.20	-0.09
Conscientious	-0.13	0.02	0.35**	0.05	-0.24
Neuroticism	0.02	0.21	-0.28	0.19**	-0.07
Openness/Intel	-0.28	-0.08	-0.02	-0.01	0.69**
Ad Framing — Packing Cubes					
Predictor	Extraversion	Agreeableness	Conscientious	Neuroticism	Openness
Extraversion	0.37**	-0.11	0.10	0.06	-0.11
Agreeableness	0.06	0.21**	0.04	0.09	-0.07
Conscientious	0.02	0.00	0.35**	-0.10	-0.19
Neuroticism	-0.07	0.22	-0.28	0.21**	-0.10
Openness/Intel	-0.28	-0.15	-0.03	0.09	0.65**
Ad Framing — Water Bottle					
Predictor	Extraversion	Agreeableness	Conscientious	Neuroticism	Openness
Extraversion	0.72**	-0.16	0.03	0.08	-0.27
Agreeableness	0.26	0.14**	-0.04	0.18	-0.16
Conscientious	0.16	-0.01	-0.02	0.15	-0.22
Neuroticism	-0.14	0.24	-0.17	0.15**	-0.06
Openness/Intel	-0.09	-0.11	0.00	0.08	0.53**

Note: The values in the table are Pearson's correlations (r)  
 \*p < 0.05; \*\*p < 0.020397 (FDR-adjusted)

Table 10

*Gemini-1.5 Flash. Synthetic Twin Agents: Big Five Personality Traits as Predictors of Advertisement Effectiveness Ratings (Pearson's Correlations)*

Ad Framing — Cabin Luggage					
Predictor	Extraversion	Agreeableness	Conscientious	Neuroticism	Openness
Extraversion	0.19**	0.01	0.00	0.05	-0.05
Agreeableness	0.06	0.23**	0.03	-0.05	-0.08
Conscientious	0.03	-0.07	0.01	0.26	-0.15
Neuroticism	-0.12	0.23	-0.13	-0.02	-0.02
Openness	-0.16	0.02	0.17	-0.24	0.26**
Ad Framing — Packing Cubes					
Predictor	Extraversion	Agreeableness	Conscientious	Neuroticism	Openness
Extraversion	0.27**	-0.09	-0.10	0.08	-0.01
Agreeableness	0.14	0.19**	-0.07	0.00	0.01
Conscientious	-0.04	-0.08	0.18**	-0.04	-0.04
Neuroticism	-0.04	0.17	-0.05	-0.06	-0.03
Openness	-0.21	0.08	-0.08	0.03	0.33**
Ad Framing — Water Bottle					
Predictor	Extraversion	Agreeableness	Conscientious	Neuroticism	Openness
Extraversion	0.43**	-0.15	0.10	0.03	-0.16
Agreeableness	0.36	0.13**	-0.02	0.08	-0.19
Conscientious	0.04	-0.04	0.10	0.09	-0.13
Neuroticism	0.03	0.19	-0.03	-0.03	-0.16
Openness	0.01	0.01	-0.12	0.02	0.36**

Note: The values in the table are Pearson's correlations (r)  
 \*p < 0.05; \*\*p < 0.020397 (FDR-adjusted)

Table 11

*Gemini-2.0 Flash. Synthetic Twin Agents: Big Five Personality Traits as Predictors of Advertisement Effectiveness Ratings (Pearson's Correlations)*

Ad Framing — Cabin Luggage					
Predictor	Extraversion	Agreeableness	Conscientious	Neuroticism	Openness
Extraversion	0.26**	-0.06	-0.02	0.14	-0.09
Agreeableness	0.02	0.25**	0.022	0.10	-0.15
Conscientious	-0.07	-0.05	0.27**	0.05	-0.12
Neuroticism	-0.10	0.08	-0.16	0.10	-0.01
Openness	0.05	0.10	-0.02	0.08	0.15**
Ad Framing — Packing Cubes					
Predictor	Extraversion	Agreeableness	Conscientious	Neuroticism	Openness
Extraversion	0.17**	-0.09	0.05	0.11	0.02
Agreeableness	0.07	0.23**	0.01	0.12	-0.06
Conscientious	-0.04	-0.04	0.24**	0.08	-0.13
Neuroticism	-0.17	0.24	-0.27	0.11	-0.01
Openness	0.05	0.09	0.08	-0.03	0.23**
Ad Framing — Water Bottle					
Predictor	Extraversion	Agreeableness	Conscientious	Neuroticism	Openness
Extraversion	0.27**	-0.02	0.09	0.00	-0.11
Agreeableness	0.121	0.06	0.10	0.08	-0.10
Conscientious	0.03	-0.08	0.20**	0.08	-0.14
Neuroticism	-0.04	0.11	-0.10	0.06	-0.08
Openness	0.00	-0.01	0.04	0.03	0.31**

Note: The values in the table are Pearson's correlations (r)  
 \* $p < 0.05$ ; \*\* $p < 0.020397$  (FDR-adjusted)

## References

Gignac, G. E., & Szodorai, E. T. (2016). Effect size guidelines for individual differences researchers. *Personality and individual differences*, 102, 74-78.  
<https://doi.org/10.1016/j.paid.2016.06.069>

Matz, S. C., Kosinski, M., Nave, G., & Stillwell, D. J. (2017). Psychological targeting as an effective approach to digital mass persuasion. *Proceedings of the National Academy of Sciences - PNAS*, 114(48), 12714–12719.  
<https://doi.org/10.1073/pnas.1710966114>

Vedel, A. (2016). Big Five personality group differences across academic majors: A systematic review. *Personality and Individual Differences*, 92, 1–10.  
<https://doi.org/10.1016/j.paid.2015.12.011>