

Incentive alignment in anchored MaxDiff yields superior predictive validity

Web Appendix

Joshua Benjamin Schramm

joshua.schramm@wiwi.tu-chemnitz.de

ORCID: 0000-0001-5602-4632

Chair of Marketing and Retailing, Faculty of Economics, Chemnitz University of Technology, Chemnitz, (Saxony), Germany

Chair of Marketing, Faculty of Economics and Management, Otto von Guericke University Magdeburg, Magdeburg (Saxony-Anhalt), Germany

Marcel Lichters (corresponding author)

marcel.lichters@ovgu.de

ORCID: 0000-0002-3710-2292

Chair of Marketing, Faculty of Economics and Management, Otto von Guericke University Magdeburg, Magdeburg (Saxony-Anhalt), Germany

Web Appendix A: Best-Worst Scaling/ Maximum Difference Scaling applications in marketing research

Table A1.

Best-Worst Scaling/Maximum Difference Scaling applications in the top 100 listed marketing journals in the SCImago Journal & Country Rank in 2021 (SCImago 2021) and the Sawtooth Software conference proceedings.

Study	Journal	BWS Type	Direct*	Indirect	Incentive-aligned	Research stimuli / research context	Research findings regarding anchoring or incentive alignment
Chrzan & Golovashkina (2006)	IJMR	Case 1	/	/	/	Casual dining restaurants	/
Louviere & Islam (2008)	JBR	Case 1	/	/	/	Fruit juice and delivered pizza	/
Garver (2009)	IJMR	Case 1	/	/	/	Customer satisfaction	/
Lattery (2010)	PSSC**	Case 1	X	X	/	<i>Not specified</i> + simulated data comparison	Direct anchored: shorter response times; more context-sensitive // indirect anchored: participants choose middle option in anchor question most often
Mueller et al. (2010).	ML	Case 1	/	/	/	Red wine packaging	/
Lockshin & Cohen (2011)	EJM	Case 1	/	/	/	Wine purchase in a retail store	/
Horne et al. (2012)	PSSC**	Case 1	X	X		Personalized content in web application + data simulation	Direct anchored: shorter response time; more context-sensitive; better in assessing true utilities in data simulation
Johnson & Fuller (2012)	PSSC**	Case 1	X	X	/	Mobile apps	Indirect anchored: more variance in utilities
Louviere et al. (2013)	IJRM	Case 1	/	/	/	Study 1: weekend getaway Study 2: marketing journals	/
McCullough (2013)	PSSC**	Case 1	X	/	/	Brand imagery statements	Direct binary response prone to scale usage bias
Mau et al. (2013)	PSSC**	Case 1	X	/	/	Concept testing	/
Lee & Dotson (2013)	PSSC**	Case 1	X	X	/	Data simulation	Direct anchored: not preferable if consistency among respondents is not high; performs better if there are a lot of items but few choice tasks

Study	Journal	BWS Type	Direct*	Indirect	Incentive-aligned	Research stimuli / research context	Research findings regarding anchoring or incentive alignment
Burke et al. (2014)	EJM	Case 1	/	/	/	Reasons for & against ethical product consumption	/
Furlan & Turner (2014)	IJMR	Case 1	/	/	/	<i>Data simulation</i>	/
O'Brien et al. (2015)	JSM	Case 1	/	/	/	Preferences for social issues	/
Liakhovitski et al. (2015)	PSSC**	Case 1	/	X/	/	Study 1: painkiller-related messages Study 2: messages	/
Johnson & Griffin (2015)	PSSC**	Case 1	X	/	/	Reward portfolio optimization	/
Heyman & Sailors (2016)	IJMR	Case 1	/	/	/	Fruit preferences	/
Currie & Mizerski (2016)	JRCS	Case 1	/	/	/	Rebate promotion requirements	/
Firestone (2016)	PSSC**	Case 1	X	/	/	Ice cream flavors	/
White & Johnson (2016)	PSSC**	Case 1	X	/	/	Policy statements	/
Serpetti et al. (2016)	PSSC**	Case 1	X	/	/	Items related to ice-cream	/
Tang et al. (2016)	PSSC**	Case 1	X	/	/	Concept test	/
Pascoe et al. (2017)	APJML	Case 1	/	/	/	Brand attribute statements	/
Kaufmann et al. (2018)	JSCM	Case 1	/	/	/	Behaviors in B2B negotiations	/
Morgan et al. (2018)	JFPM	Case 1	/	/	/	Corporate social responsibility in food and agriculture	/
Pinto et al. (2019)	APJML	Case 1	/	/	/	Choice factors in smartphone purchase decisions	/
Huang et al. (2019)	JRCS	Case 1	/	/	/	Values preferences for mobile marketing campaigns	/
Konopka et al. (2019)	EJM	Case 3	/	/	/	Ethical logos for packaged coffee	/
Lattery (2019)	PSSC**	Case 1	X	/	/	Data fusion	/

Study	Journal	BWS Type	Direct*	Indirect	Incentive-aligned	Research stimuli / research context	Research findings regarding anchoring or incentive alignment
Bakken et al. (2019)	PSSC**	Case 1	X	/	/	Candidates for the 2020 U.S. Presidential election	/
Rausch et al. (2021)	JRCS	Case 1	/	/	/	Study 1a: apparel purchase (sustainable and conventional attributes) Study 1b: Sustainable apparel and price-related attributes Study 2a: Sustainable apparel attributes Study 2b: sustainable and conventional online shop attributes	/
Hierden et al. (2021)	IJBM	Case 1	/	/	/	Community investment options	/
Schreiner & Baier (2021)	JMM	Case 1	/	/	/	Marketing actions used by online apparel retailers	/
Peitz & Lerner (2021)	PSSC**	Case 1	X	/	/	Smart displays	Directly anchored MaxDiff predicted (hypothetical) holdout tasks vs. than choice based conjoint (CBC)
Heo et al. (2022)	JBR	Case 1	/	/	/	Peer-to-peer accommodations	/
Brand & Baier (2022)	IMR	Case 1	/	/	/	Product categories made in Germany	/
Nolan & Hobbs (2023)	JFPM	Case 1	/	/	/	Food labels	/
							(1) Incentive alignment in anchored MaxDiff yields superior predictive validity with regard to product choices/rankings
							(2) Insignificant difference in predictive validity between direct and indirect anchoring
							(3) Hypothetical (vs. incentive-aligned) anchored MaxDiff significantly overestimates general product demand
							(4) Higher estimates for the outside good's utility with indirect (vs. direct) anchoring
Our research	ML	Case 1	X	X	X	PlayStation 5 videogames	

Note: APJML Asia Pacific Journal of Marketing and Logistics, EJM European Journal of Marketing, IJBM International Journal of Bank Marketing, IJMR International Journal of Market Research, IJRM International Journal of Research in Marketing, IMR International Marketing Review, JBR Journal of Business Research, JFPM Journal of Food Products Marketing, JMM Journal of Marketing Management, JRCS Journal of Retailing and Consumer Services, JSCM Journal of Supply Chain Management, JSM Journal of Services Marketing, ML Marketing Letters, PSSC Proceedings of the Sawtooth Software Conference

* The implementation of the directly anchored varied (e.g., check all that apply or grid), while we used a forced-choice binary choice in our study

** We only used Sawtooth Software's conference papers that applied or addressed anchored MaxDiff.

Web Appendix B: Stimuli Material

Table B1.

Overview of 16 video games used as research stimuli.

No.	Game	Price in €	No.	Game	Price in €
1	FIFA 22	40.99	9	Landwirtschafts-Simulator 22	38.99
2	Far Cry 6	37.99	10	Resident Evil 8 Village	37.99
3	Marvel's Spider-Man: Miles Morales	48.99	11	Battlefield 2042	35.99
4	Ratchet & Clank: Rift Apart	51.99	12	Marvel's Guardians of the Galaxy	46.99
5	Call of Duty Vanguard	46.99	13	Uncharted Legacy of Thieves	30.99
6	Assassin's Creed Valhalla	34.99	14	WWE 2K22	45.99
7	Kena: Bridge of Spirits	42.99	15	Gran Turismo 7	49.99
8	Sackboy: A Big Adventure	47.99	16	Overcooked! All You Can Eat	33.99

Table B2.

Validation task 1, free-choice.

 FIFA 22 (Sport) 40,99 €	 Sackboy: A Big Adventure (Action) 47,99 €	 Landwirtschafts-Simulator 22 (Simulation) 38,99 €	 Uncharted Legacy of Thieves Collection (Action-Adventure) 30,99 €
 WWE 2K22 (Sport) 45,99 €	 Gran Turismo 7 (Rennspiel) 49,99 €	 Overcooked! All You Can Eat (Simulation) 33,99 €	 None of these games

Table B3.

Validation task 2, free-choice.

 FIFA 22 (Sport) 40,99 €	 Far Cry 6 (Shooter) 37,99 €	 Marvel's Spider-Man Miles Morales (Action) 48,99 €	 Call of Duty Vanguard (Shooter) 46,99 €
 Assassin's Creed Valhalla (Rollenspiel) 34,99 €	 Kena: Bridge of Spirits (Action-Adventure) 42,99 €	 Landwirtschafts-Simulator 22 (Simulation) 38,99 €	 Resident Evil 8: Village (Action) 37,99 €
 Battlefield 2042 (Shooter) 35,99 €	 Marvel's Guardians of the Galaxy (Action) 46,99 €	 Gran Turismo Sport (Rennspiel) 49,99 €	 None of these games

Table B4.

Validation task 3, forced-choice.

 Marvel's Spider-Man Miles Morales (Action) 48,99 €	 Ratchet & Clank: Rift Apart (Action) 51,99 €	 Call of Duty Vanguard (Shooter) 46,99 €	 Assassin's Creed Valhalla (Rollenspiel) 34,99 €
 Sackboy: A Big Adventure (Action) 47,99 €	 Uncharted Legacy of Thieves Collection (Action-Adventure) 30,99 €	 WWE 2K22 (Sport) 45,99 €	 Overcooked! All You Can Eat (Simulation) 33,99 €

Note: This validation task had a dual-response question, in which participants could specify if they would buy the product chosen in this task.

Table B5.

Validation task 4, ranking task.

 Far Cry 6 (Shooter) 37,99 €	 Ratchet & Clank: Rift Apart (Action) 51,99 €	 Kena: Bridge of Spirits (Action-Adventure) 42,99 €	 Resident Evil 8: Village (Action) 37,99 €
 Battlefield 2042 (Shooter) 35,99 €	 Marvel's Guardians of the Galaxy (Action) 46,99 €		

Note: This validation task had a limit card question (Backhaus et al. 2007), in which participants could specify up to which rank, they would buy or if they would buy none of the games.

Web Appendix C: Additional study information and results

Table C1.

Demographics and gaming-related questions.

		Direct anchor incentive-aligned	Direct anchor hypothetical	Indirect anchor incentive-aligned	Indirect anchor hypothetical
		<i>n</i> = 112	<i>n</i> = 118	<i>n</i> = 109	<i>n</i> = 109
Gender	female	45%	40%	37%	49%
	male	54%	60%	63%	51%
	divers	1%	/	/	/
Age	Mean	41.87	38.89	38.74	37.46
	<i>SD</i>	14.67	14.29	13.53	14.28
Gaming	< once a month	3%	7%	4%	6%
Frequency	1-3 a month	13%	10%	14%	12%
	weekly	24%	25%	28%	18%
	several times a week	36%	36%	33%	43%
	daily	25%	23%	22%	20%
Income	< €500	13%	14%	9%	16%
	€500 - €999	12%	14%	17%	18%
	€1,000 - €1,499	16%	21%	15%	18%
	€1,500 - €1,999	19%	15%	15%	16%
	€2,000 +	36%	31%	39%	26%
	<i>prefer not to say</i>	5%	3%	6%	6%
Video	PlayStation	86%	83%	85%	77%
Consoles (% yes)	XBOX	27%	24%	28%	26%
	Nintendo	35%	41%	43%	45%
	<i>No console</i>	0%	2%	3%	4%
Games ownership (% yes)	FIFA 22	29%	26%	28%	17%
	Far Cry 6	13%	9%	8%	7%
	Marvel's Spider-Man: Miles Morales	10%	10%	7%	10%
	Ratchet & Clank: Rift Apart	6%	8%	5%	4%
	Call of Duty Vanguard	15%	10%	17%	13%
	Assassin's Creed Valhalla	14%	15%	22%	15%
	Kena: Bridge of Spirits	5%	3%	3%	4%
	Sackboy: A Big Adventure	7%	5%	4%	4%
	Landwirtschafts-Simulator 22	3%	8%	6%	7%
	Resident Evil 8 Village	5%	6%	9%	8%
	Battlefield 2042	8%	7%	6%	11%
	Marvel's Guardians of the Galaxy	6%	5%	5%	3%

	Direct anchor incentive-aligned	Direct anchor hypothetical	Indirect anchor incentive-aligned	Indirect anchor hypothetical
	<i>n</i> = 112	<i>n</i> = 118	<i>n</i> = 109	<i>n</i> = 109
Uncharted Legacy of Thieves	9%	9%	14%	8%
WWE 2K22	5%	2%	3%	2%
Gran Turismo 7	17%	16%	15%	10%
Overcooked! All You Can Eat	10%	7%	2%	8%
<i>none</i>	36%	42%	40%	47%

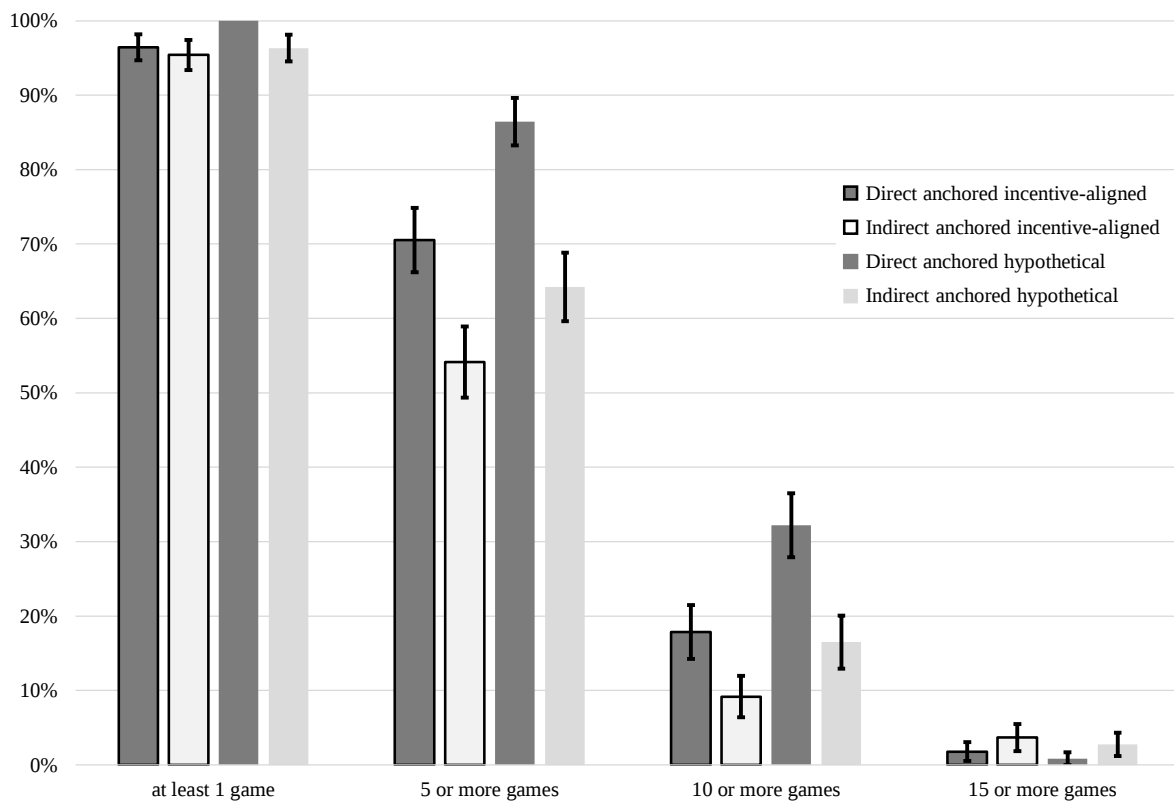
Table C2.

Mean raw utilities and standard deviations by condition (lower-level means over posterior draws).

Game	Direct anchor incentive-aligned		Direct anchor hypothetical		Indirect anchor incentive-aligned		Indirect anchor hypothetical	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
FIFA 22	-1.48 (6.95)	5.10	-1.25 (7.41)	7.16	-3.18 (7.02)	6.75	-2.89 (6.13)	6.02
Far Cry 6	-0.83 (5.17)	3.14	0.17 (5.61)	3.60	-0.88 (6.86)	3.77	-0.91 (6.43)	4.52
Marvel's Spider-Man: Miles Morales	-0.56 (5.28)	3.24	0.73 (6.25)	3.59	-1.05 (5.61)	3.14	-0.60 (5.86)	3.35
Ratchet & Clank: Rift Apart	-0.98 (5.60)	3.14	-0.69 (4.54)	3.83	-2.30 (3.84)	3.15	-1.04 (6.07)	3.49
Call of Duty Vanguard	0.48 (8.52)	4.60	0.26 (6.55)	4.11	-1.65 (6.69)	4.91	-1.47 (6.13)	5.17
Assassin's Creed Valhalla	0.35 (7.65)	3.14	2.12 (8.50)	3.83	0.31 (9.70)	3.58	0.80 (10.59)	4.43
Kena: Bridge of Spirits	-1.47 (4.91)	3.15	-0.13 (5.61)	3.88	-2.09 (5.18)	3.83	-0.94 (6.46)	4.12
Sackboy: A Big Adventure	-2.00 (4.65)	3.14	-0.74 (4.97)	4.24	-2.91 (4.05)	3.57	-1.54 (5.05)	3.73
Landwirtschafts -Simulator 22	-3.81 (3.52)	4.56	-2.68 (4.12)	4.61	-4.75 (1.72)	3.55	-3.01 (3.42)	3.80
Resident Evil 8 Village	0.01 (7.29)	3.65	0.88 (6.76)	3.75	-1.31 (6.14)	4.32	-1.12 (5.09)	4.13
Battlefield 2042	0.13 (7.64)	3.76	-0.44 (6.00)	3.78	-1.77 (5.34)	4.23	-1.76 (5.21)	4.93
Marvel's Guardians of the Galaxy Uncharted Legacy of Thieves	-0.50 (5.35)	2.56	0.07 (5.39)	3.67	-1.56 (4.46)	3.30	-1.05 (4.47)	2.75
WWE 2K22	-2.96 (2.37)	3.00	-2.33 (2.60)	3.06	-4.38 (3.02)	4.05	-4.07 (1.82)	3.58
Gran Turismo 7	0.45 (9.26)	3.11	0.96 (8.81)	3.66	-0.98 (9.32)	4.07	-1.24 (6.31)	4.00
Overcooked! All You Can Eat	-3.68 (2.07)	3.38	-1.96 (4.06)	4.33	-3.83 (2.54)	3.57	-2.28 (4.85)	3.79
Anchor	0 (7.35)	NA	0 (4.71)	NA	0 (10.77)	NA	0 (8.43)	NA

Note: choice probabilities in parentheses calculated according to the following formula $P_j = \frac{\exp^{u_j}}{(\exp^{u_j} + a - 1)}$ (Chrzan and Orme 2019, p. 59)

Fig. C1 Share of participants willing to buy ≥ 1 game, ≥ 5 games, ≥ 10 games, and ≥ 15 games by condition



Note: error bars represent standard errors, means with a variance of zero are not accompanied by an error bar

References

- Backhaus, K., Wilken, R., & Hillig, T. (2007). Predicting Purchase Decisions with Different Conjoint Analysis Methods: A Monte Carlo Simulation. *International Journal of Market Research*, 49, 341–364. doi:10.1177/147078530704900306.
- Chrzan, K., & Orme, B. K. (2019). *Applied MaxDiff: A Practitioner's Guide to Best-Worst Scaling*. Provo, UT: Sawtooth Software.
- SCImago. (2021). Scimago Journal & Country Rank.
<https://www.scimagojr.com/journalrank.php>.