Engaging with Senses and Experience

Lecture 08 (Synthesis II)

Alessandro Vinciarelli

Outline

- Screen and Immersion
- Appearance Perception
- Appearance Perception and Experience
- Conclusions

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From Screen to Immersion

- When passing from the screen to an immersive environment (Virtual Reality), there are multiple important changes;
- From monocular to binocular vision, unpredictable perception changes, depending on the task, the performance improves (60%), remains unchanged (25%) or deteriorates (15%);
- Immersion allows motion parallax (helpful in depth perception), changes the view scale (from 10-12:1 to life-size), requires head tracking;

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The Glasgow Agent Corpus (I)

- The factorial design is 2 (gender) x 3 (height values) x 3 (face shapes) x 3 (body volumes) = 54;
- The gender is binary because 99% of the people identify as female or male;
- The height values reflect the distribution, they are 155cm, 165cm and 175cm for female agents and 165cm, 175cm and 185 cm for male agents;
- The face shapes are base, square and round;
- The body volumes are ectomorph, mesomorph and endomorph.

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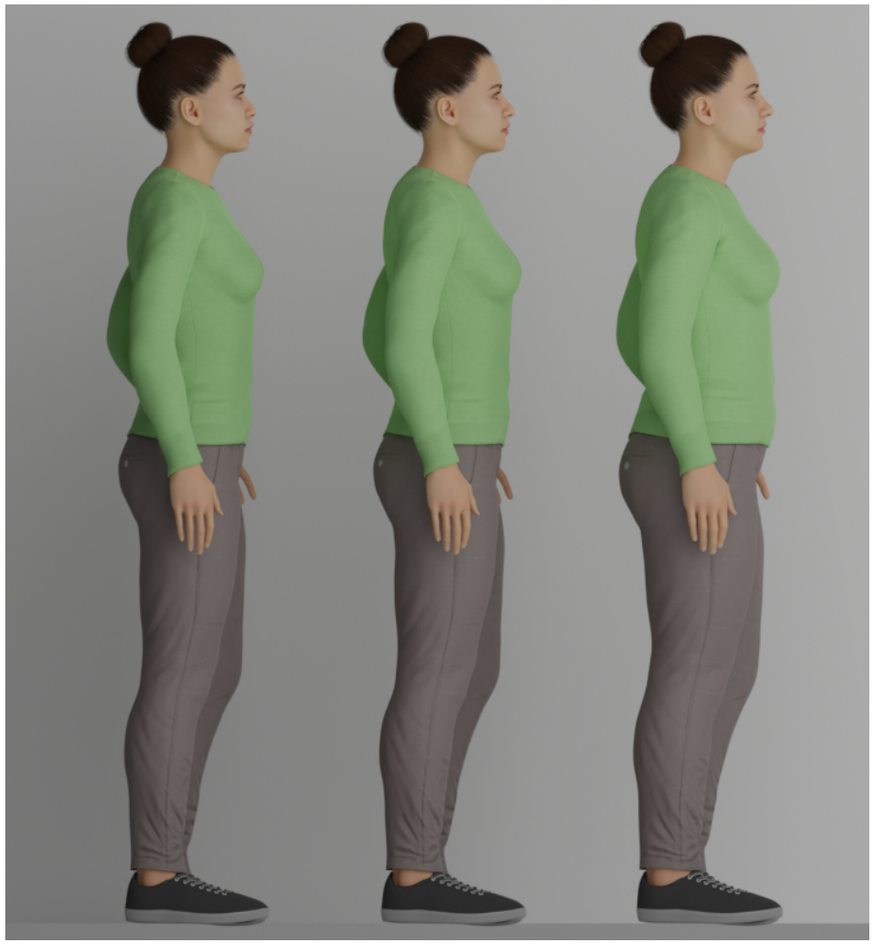
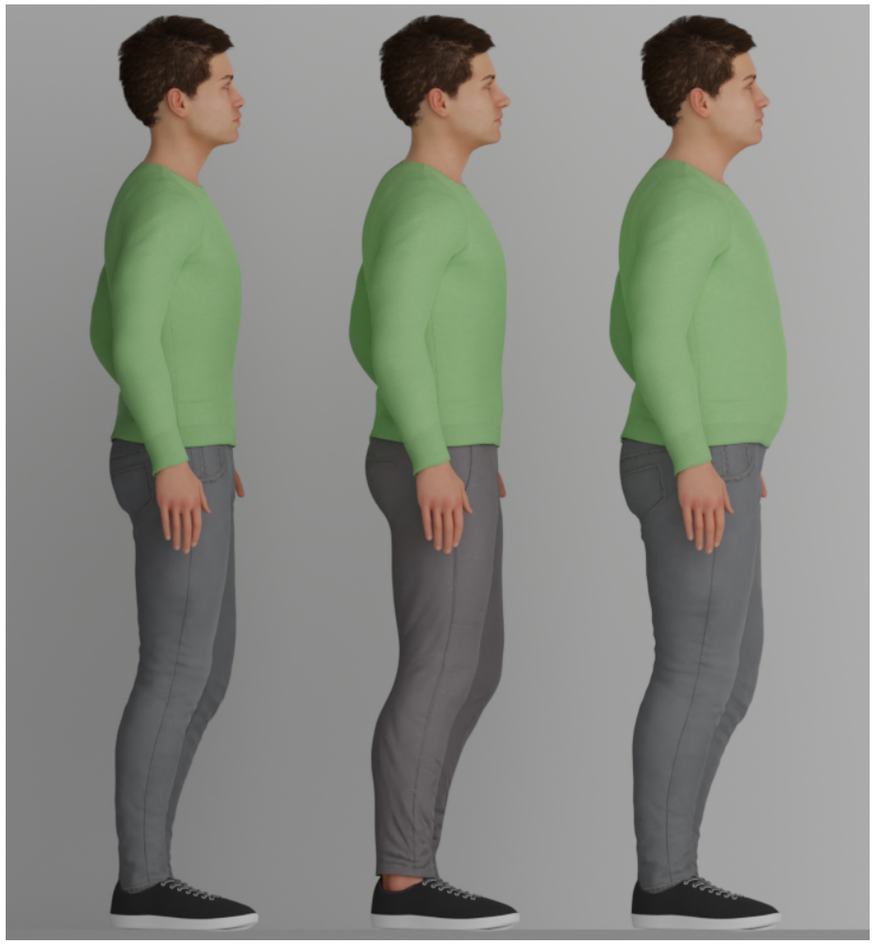
The Glasgow Agent Corpus (II)





- Stereotypical judgments affect attribution of emotions, performance and quality as job candidate (among others).

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The Glasgow Agent Corpus (III)

- “Consensus in personality judgments [is] comparable to the consensus in facial feature judgments [and there is] a broad correspondence between the similarity clustering of both types of judgments.”

Todorov, Olivola, Dotsch, and Mende-Siedlecki, “Social attributions from faces: Determinants, consequences, accuracy, and functional significance,” Annual Review of Psychology, vol. 66, no. 1, pp. 519–545, 2015.

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The Glasgow Agent Corpus (IV)






- There is a “positive relationships between physical height and holding a position of authority as a manager or supervisor” [1];
- “physical height is significantly related to measure of social esteem [...], leader emergence [...], and performance” [2].

[1] Gawley, Perks, and Curtis, “Height, gender, and authority status at work: Analyses for a national sample of Canadian workers,” Sex Roles, 60(3):208–222, 2009; [2] Judge and Cable, “The effect of physical height on workplace success and income: Preliminary test of a theoretical model,” Journal of Applied Psychology, vol. 89(3):2004.

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Participants

Condition	Female	Male	Age	Height	XS	S	M	L	XL	XXL
Screen	34	31	28.0±6.6	170.2±9.2	7	14	22	10	9	3
Immersion	37	28	25.8±4.9	170.9±9.9	2	18	25	12	6	2
Total	71	59	26.9±5.9	170.6±9.6	9	32	47	22	15	5

- A pool of 130 participants split in Screen and Immersion Group;
- No statistically significant difference between Screen and Immersion Groups for gender, age, height and “body volume” distribution.

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Immersion Stimuli

- The user waits in the right room and moves to the left room to encounter the agent;
- The point of view is the same as the physical world.

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Screen Stimuli






- The stimulus is designed to provide information about key-aspects of physical appearance (face, height, body volume);
- The clothing is the same for all agents to avoid confounding effects.

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Perception

"Mirror, mirror on the wall, who in this land is fairest of all?" "You, my queen, are fair; it is true. But Snow-White is thousand times fairer than you."

Grimm and Grimm, "Sneewittchen" ("Snow-white"), Children's and Household Tales, final edition, Berlin 1857

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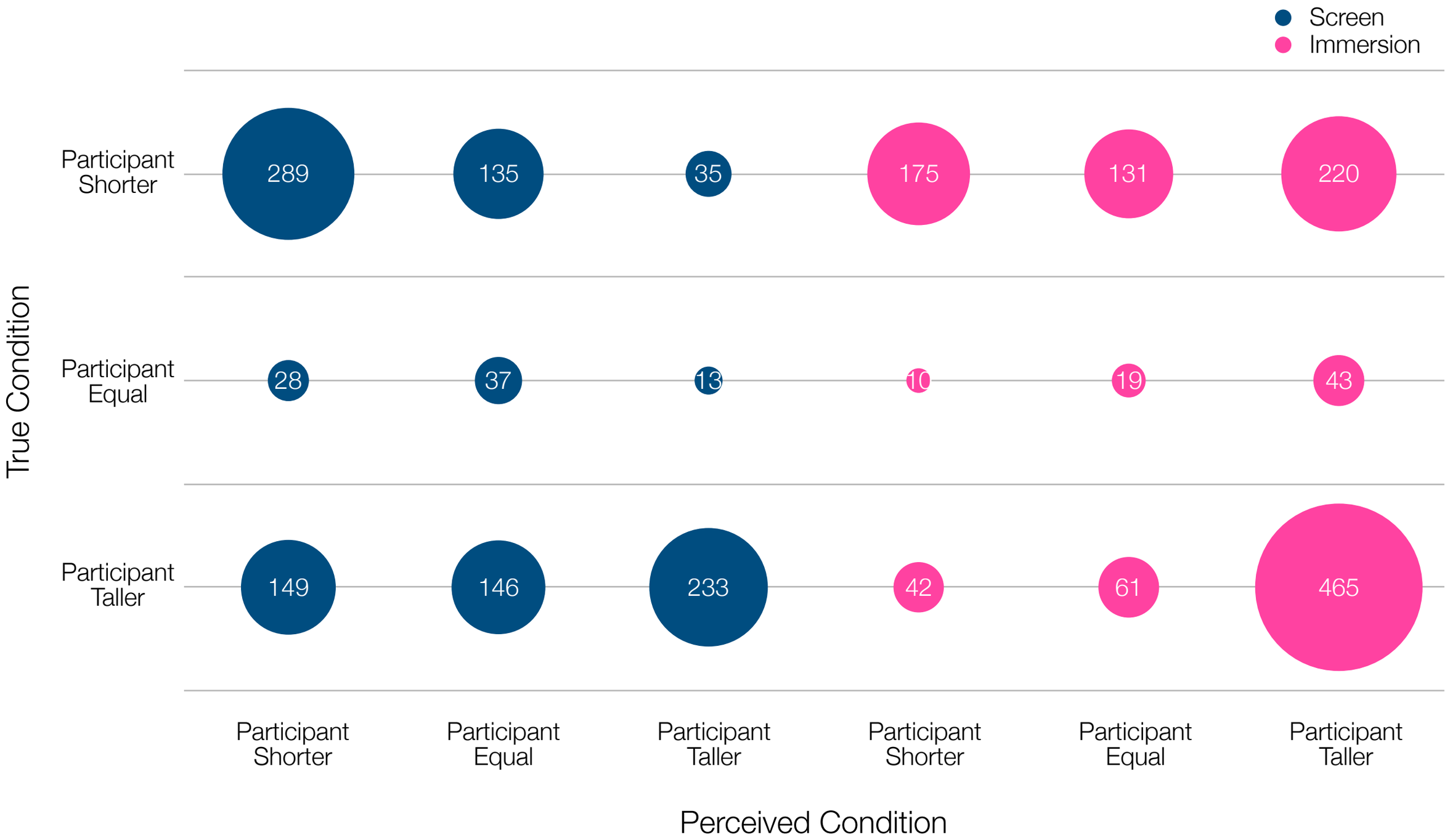
Height Difference Perception (I)



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Perception Performance

	Part. Shorter	Part. Equal	Part. Taller	Overall
SG (F)	56.1% (396)	38.9% (36)	**31.1% (180)**	47.7% (612)
SG (M)	**39.9% (168)**	54.8% (42)	50.9% (348)	47.8% (558)
IG (F)	**34.9% (427)**	**26.2% (42)**	**71.0% (193)**	44.9% (662)
IG (M)	**26.3% (99)**	26.7% (30)	**87.5% (375)**	**71.8% (504)**

- The overall accuracy is 47.8% and 56.5% for SG and IG participants, respectively (both above chance);
- The distribution over conditions is different for female and male participants.

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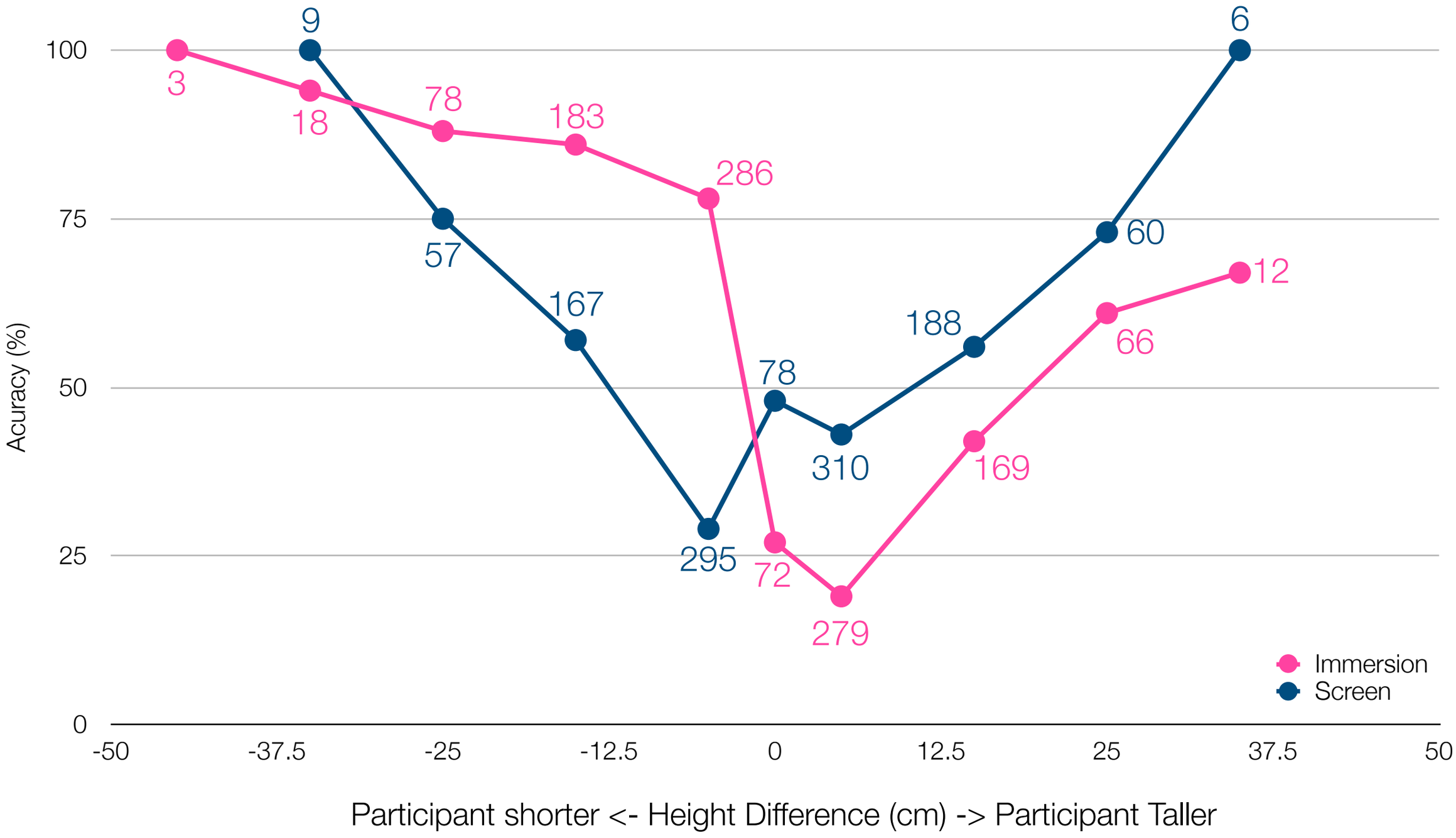
Height Difference Perception (I)



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Height Perception

- Overall, both screen and immersion participants struggle in understanding whether they are shorter or taller than the agent;
- The best performances are observed when the participants are shorter on screen and when they are taller in immersion;
- The performances are lower when the height difference is smaller, between -20 cm and 20 cm on screen, between 0 and 30 cm in immersion.

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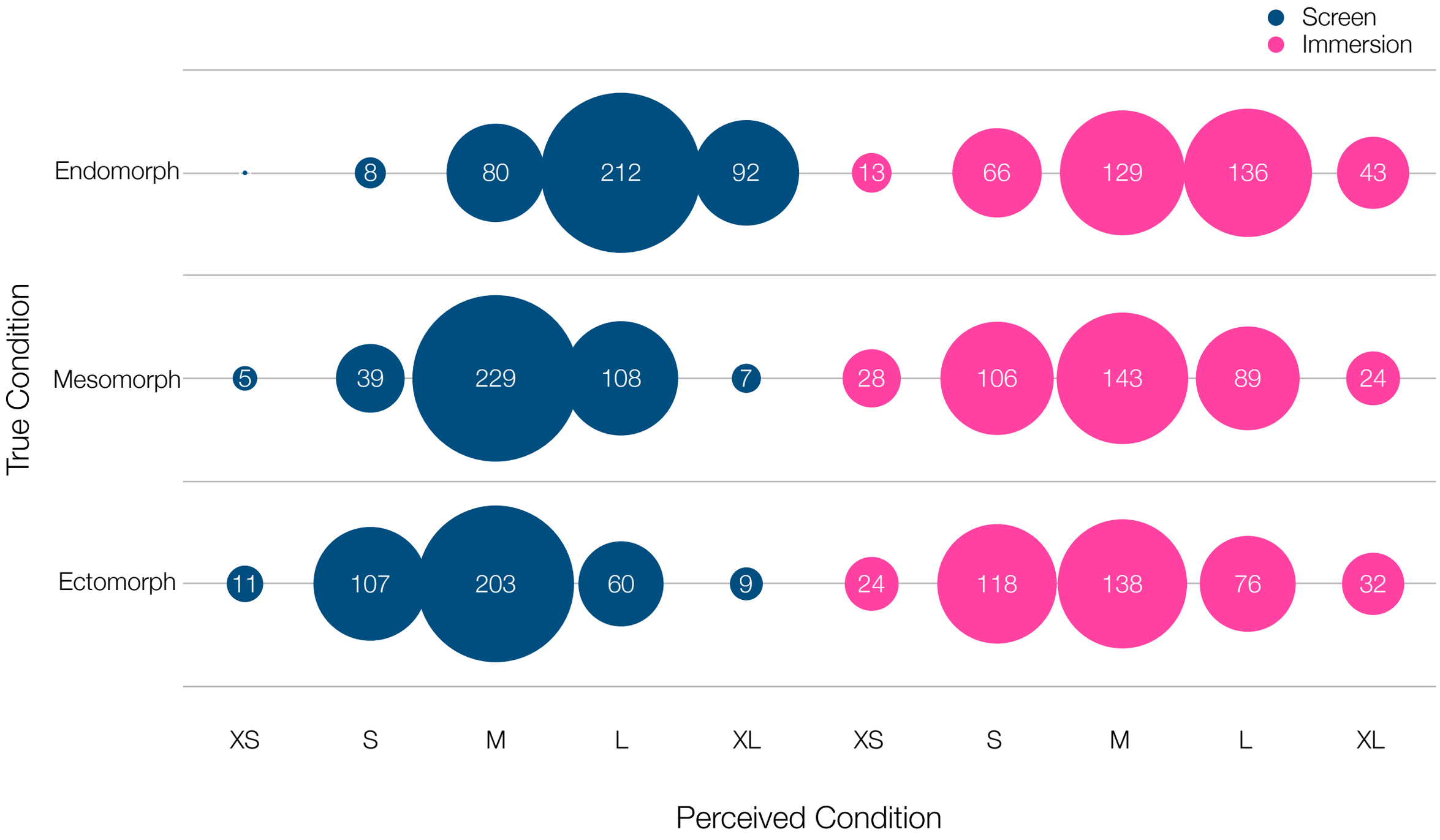
Body Volume Perception



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Body Volume Difference Perception

	Part. Smaller	Part. Equal	Part. Bigger	Overall
SG (F)	**82.3% (237)**	**65.0% (200)**	**62.3% (175)**	**70.9% (612)**
SG (M)	**85.8% (148)**	**68.2% (189)**	45.2% (221)	**63.8% (558)**
SG	**83.6% (385)**	**66.6% (389)**	52.8% (396)	**67.5% (1170)**
IG (F)	**70.4% (287)**	**38.6% (215)**	51.2% (160)	**55.4% (662)**
IG (M)	51.5% (101)	**40.2% (169)**	**63.7% (234)**	43.4% (504)
IG	**65.5% (388)**	**39.3% (384)**	**58.6% (394)**	**54.5% (1166)**

- The performance is higher for the screen participants;
- The performance tends to be higher when assessing bigger agents.

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Body Volume Perception

- Both screen and immersion participants estimate the body volume of the agents better than their height;
- The performance tends to be higher when the participants assess agents bigger than themselves;
- Screen participants perform better than immersion participants to a statistically significant extent;
- One possible reason is that people use their own body as a reference and there is no embodiment in immersion condition.

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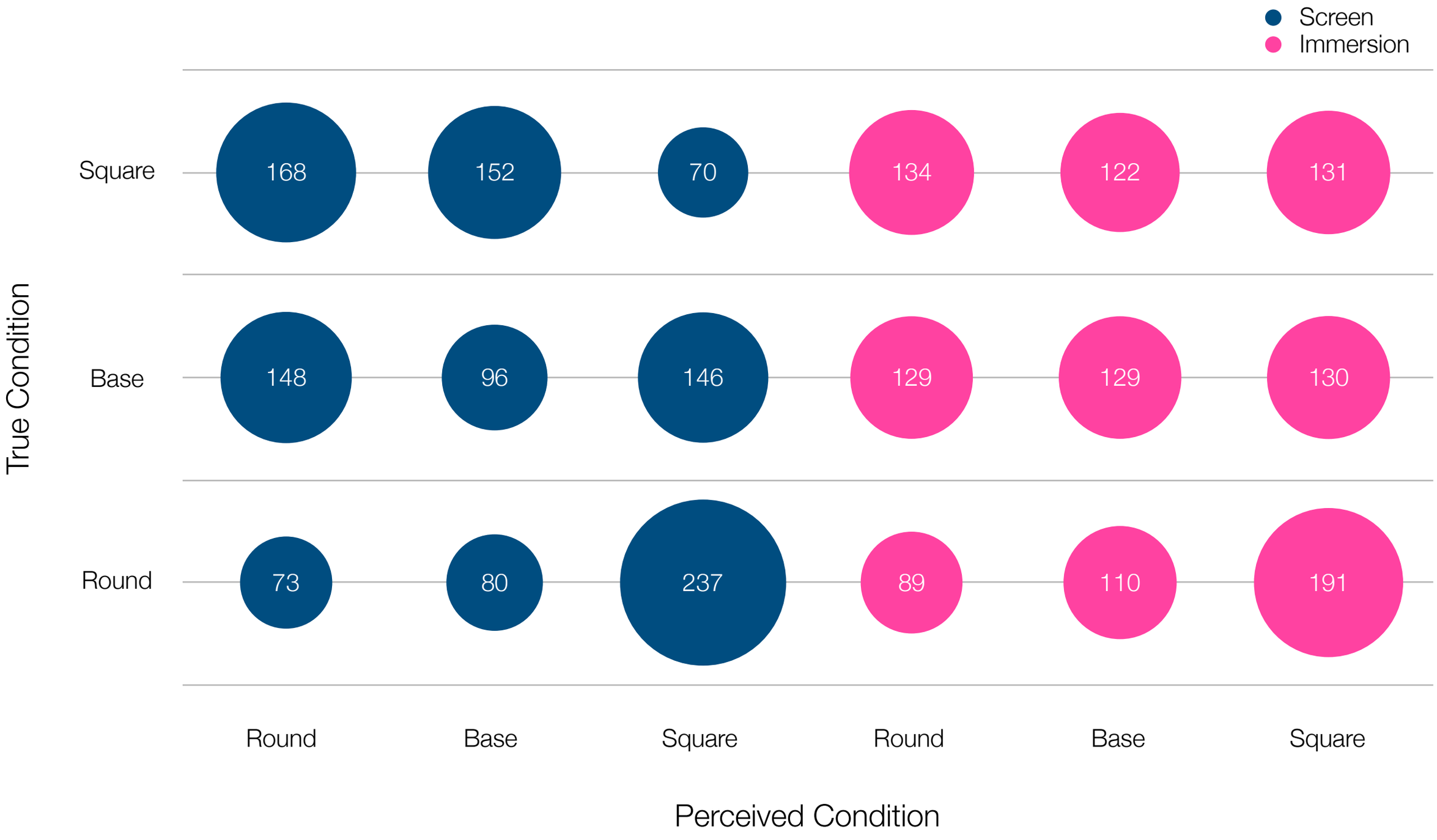
Face Shape Perception (I)



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Face Shape Perception (II)

	Square	Base	Round	Overall
SG (F)	43.1% (204)	**25.5% (204)**	**61.3% (204)**	**43.3% (612)**
SG (M)	43.0% (186)	**23.7% (186)**	**60.2% (186)**	**42.3% (558)**
SG	**43.1% (390)**	**24.6% (390)**	**60.8% (390)**	**42.8% (1170)**
IG (F)	**32.3% (220)**	**35.9% (220)**	46.8% (222)	**38.4% (662)**
IG (M)	**37.7% (167)**	**29.8% (168)**	51.8% (168)	**39.8% (503)**
IG	**34.6% (387)**	**33.2% (388)**	49.0% (390)	**39.0% (1165)**

- No difference between screen and immersion;
- The performances are better than chance, but they are limited, both on screen and in immersion.

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Face Shape Perception (III)

- Face shape perception is difficult both on screen and in immersion;
- One possible explanation is that the difference between the face shapes is too subtle;
- Screen participants perform overall better;
- The performance difference is statistically significant;
- One possible explanation is that the volume makes the perception of the shape more challenging.

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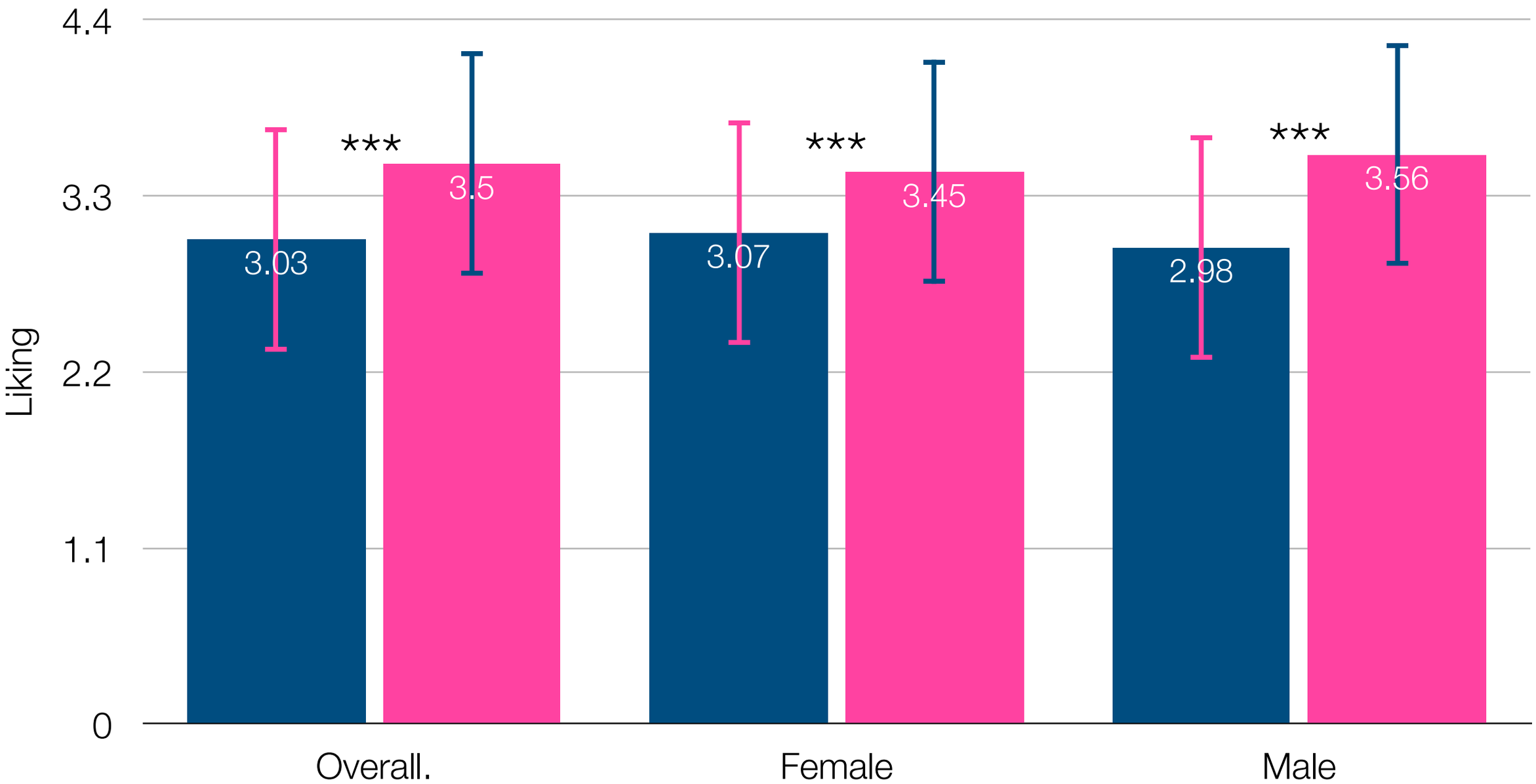
Liking



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Liking

- Users in immersion tend to like the agents more, irrespective of their gender;
- For a given presentation modality, there is no liking difference between female and male agents;
- The perception of physical features, harder in immersion, does not impact negatively on liking;
- The results confirm a pattern widely observed in the literature.

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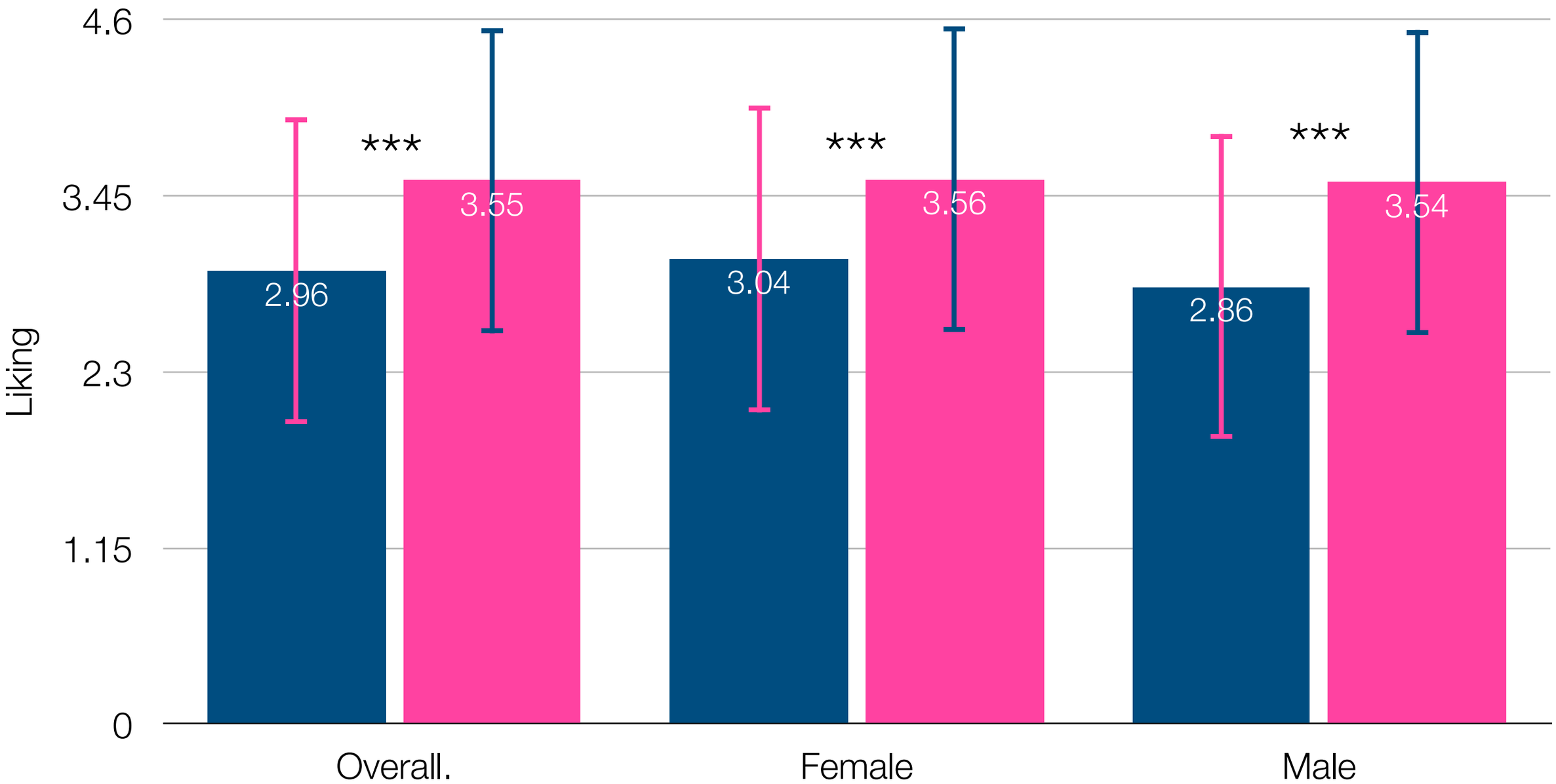
Realism



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Realism

- Users in immersion tend to consider the agents more realistic, irrespective of their gender;
- For a given presentation modality, there is no realism difference between female and male agents;
- The perception of physical features, harder in immersion, does not make the agent less realistic;
- The users tend to consider the agents more realistic even if they make more mistakes in assassin their physical features (realism does not mean reality).

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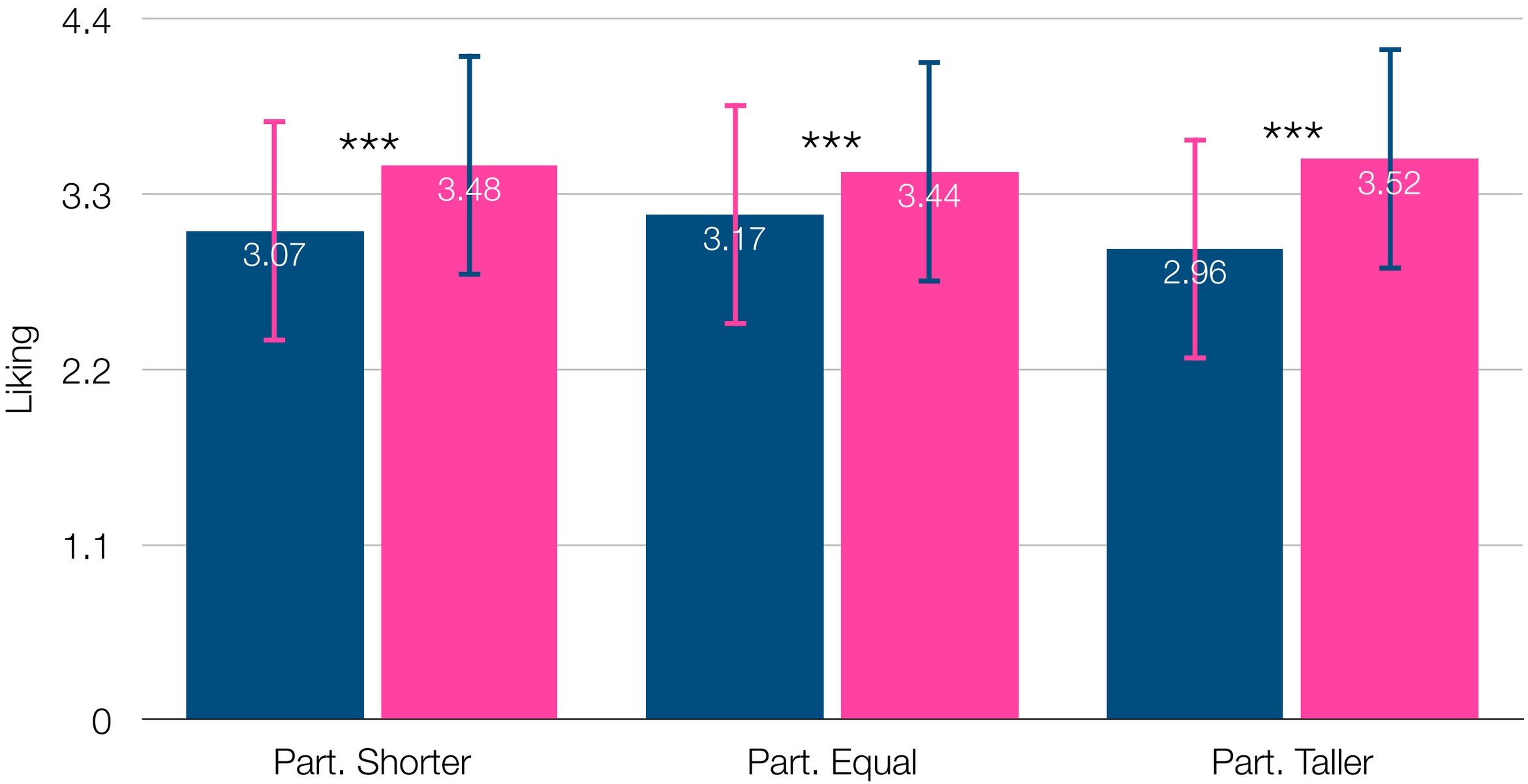
Liking vs Perceived Δh



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Liking vs Perceived Δh

- The liking increase between screen and immersion applies independently of whether the participant is shorter than, equal to or taller than the agent;
- The observation applies in the same way to female and male agents, even if the Δh distribution changes with the gender;
- The perceived Δh matters more than the actual Δh because it is what the users think it is true;
- Higher Liking typically translates into higher users' appreciation (equivalent to halo effect for humans).

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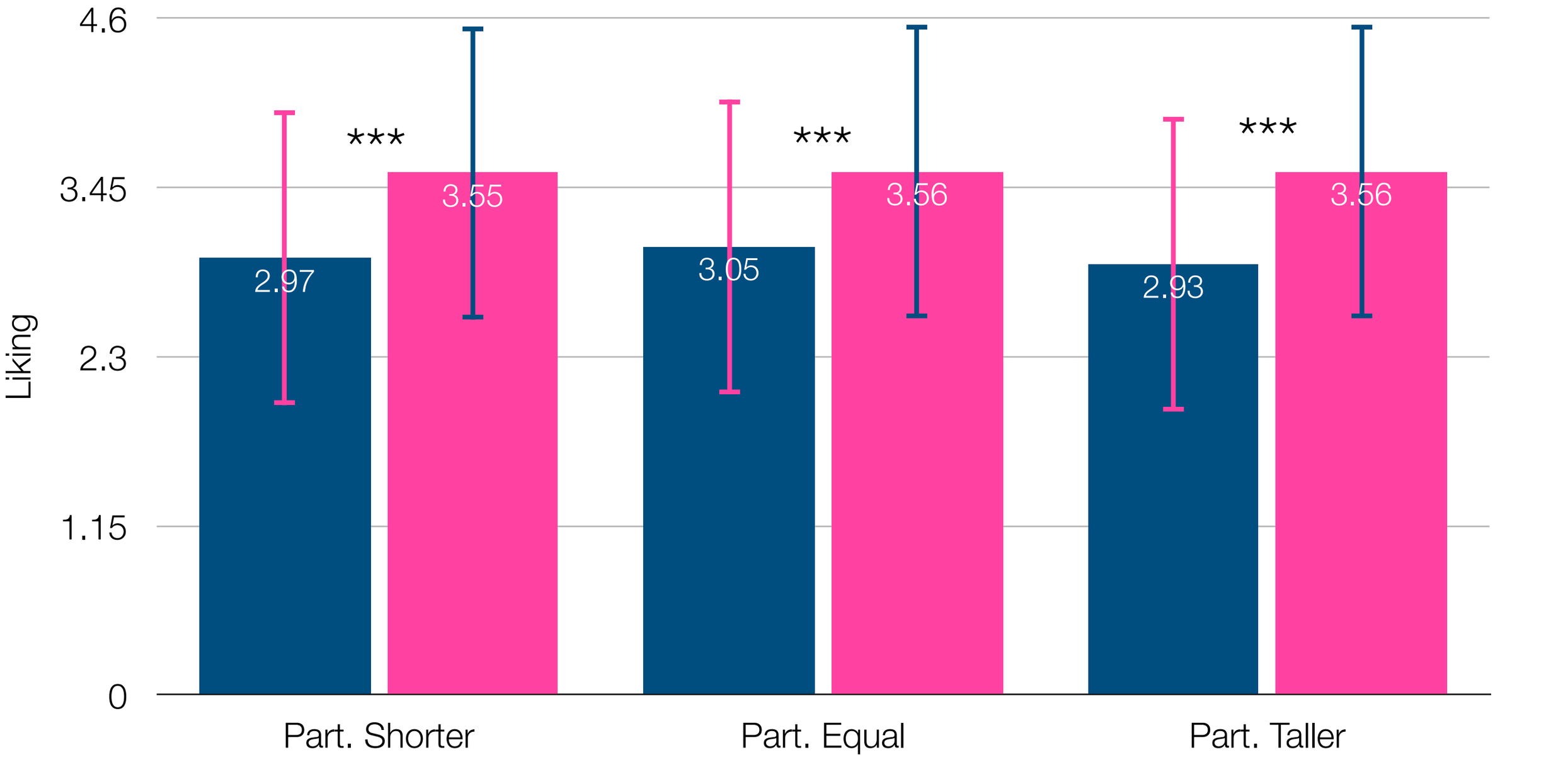
Realism vs Perceived Δh



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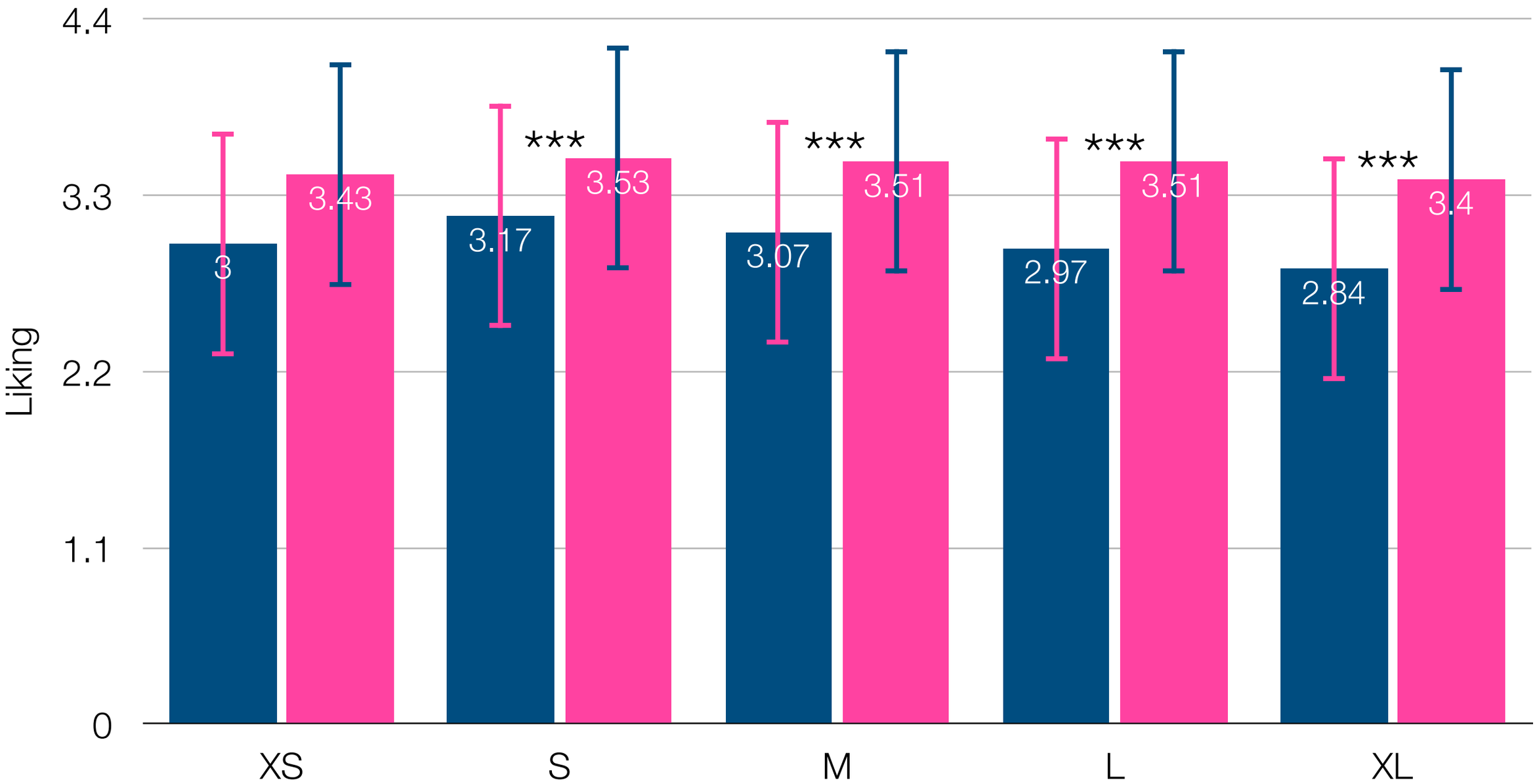
Liking vs Perceived Body Volume



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Liking vs Perceived Body Volume

- The liking increase between screen and immersion applies independently of the body volume attributed to the agent;
- The only exception is when the agents is perceived to be Extra Small (XS), but it is probably because such attribution is rare;
- The perceived Body Volume matters more than the actual Body Volume because it is what the users think it is true;
- Higher Liking typically translates into higher users' appreciation (equivalent to halo effect for humans).

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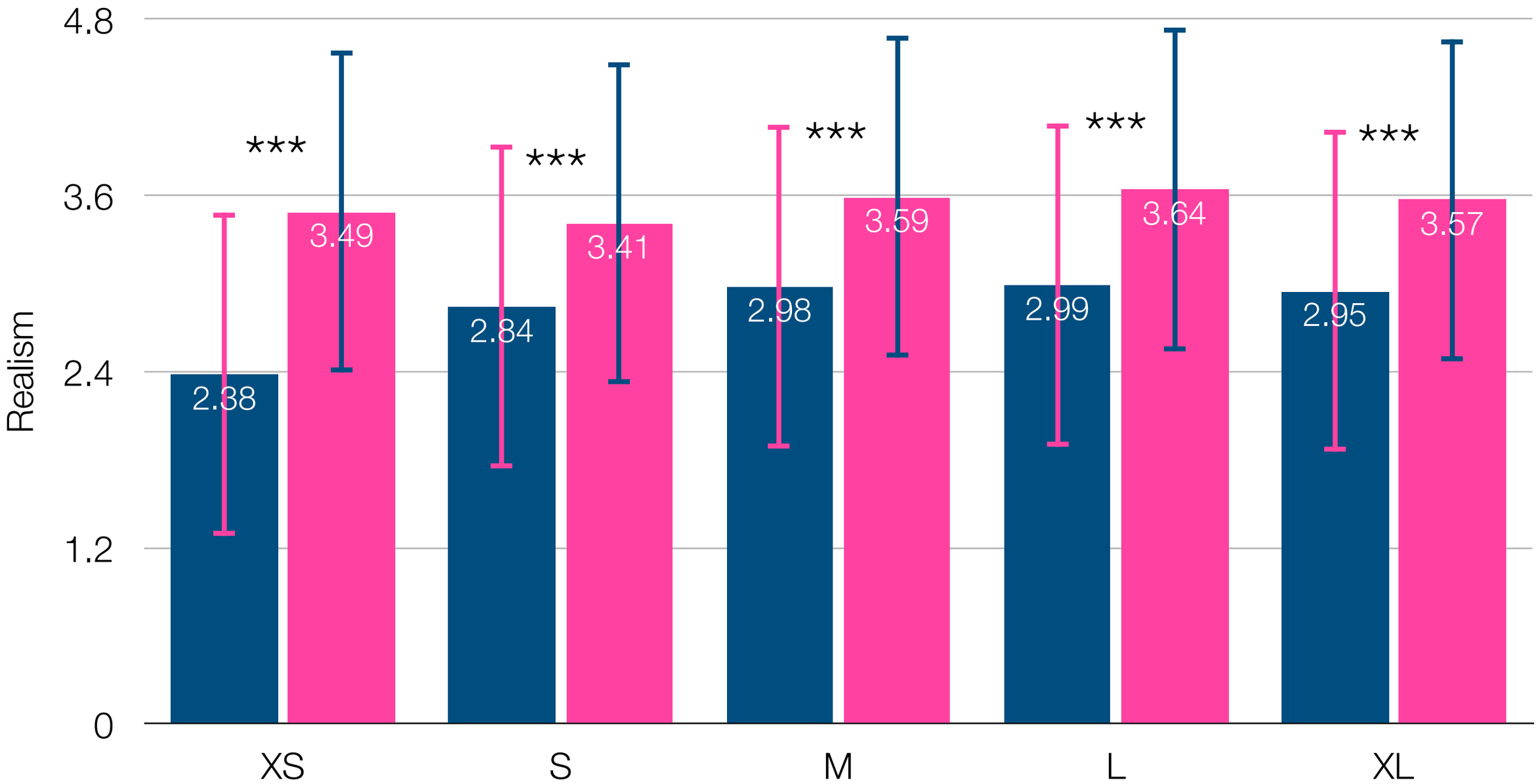
Realism vs Perceived Body Volume



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Realism vs Perceived Body Volume

- The realism increase between screen and immersion applies independently of the body volume attributed to the agent;
- The XS agents are no longer an exception, probably confirming that, in the case of the Liking, the problem is the limited number of cases;
- The perceived Body Volume matters more than the actual Body Volume because it is what the users think it is true;
- Higher Realism typically translates into better experience for immersion users.

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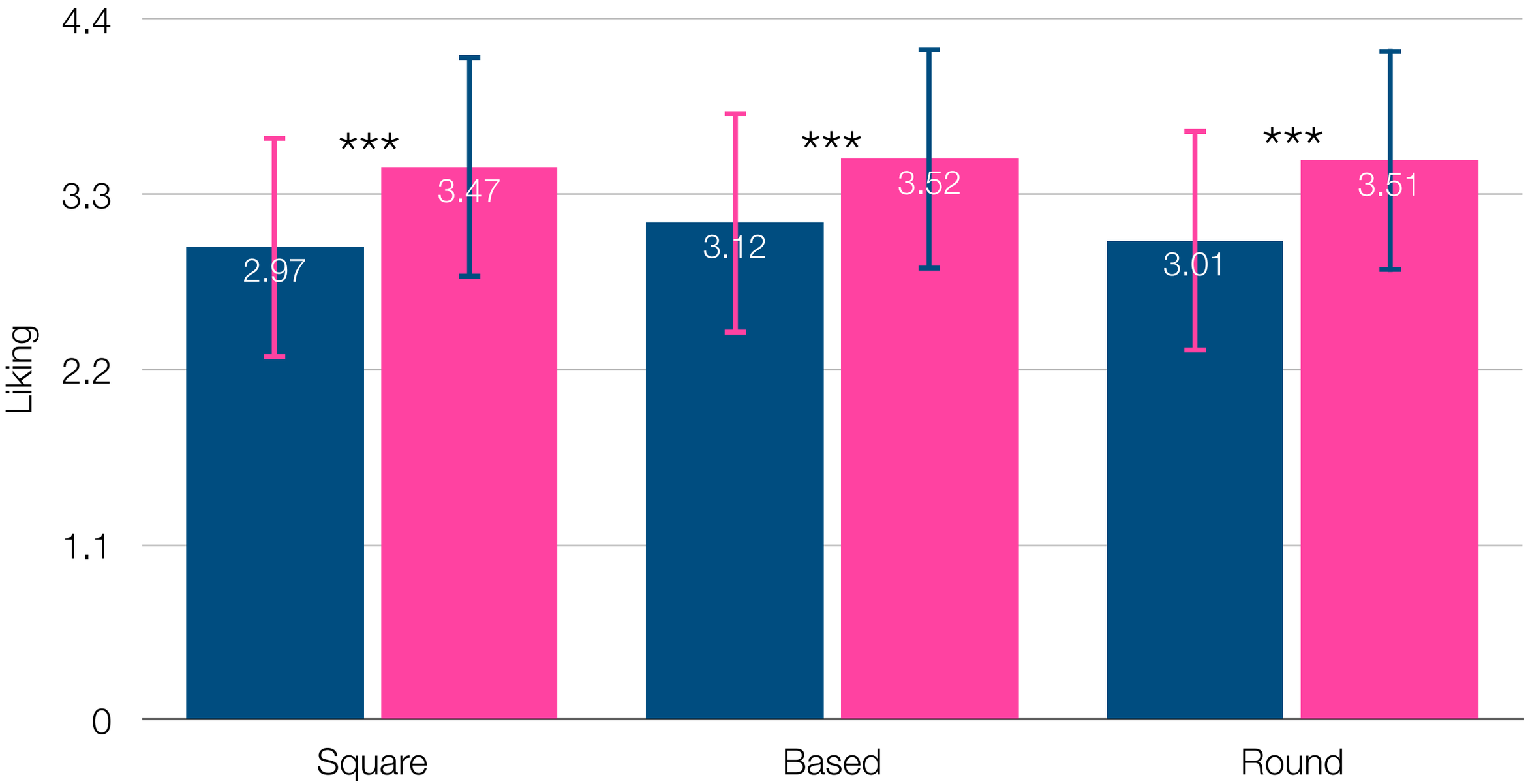
Liking vs Perceived Face Shape



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Liking vs Perceived Face Shape

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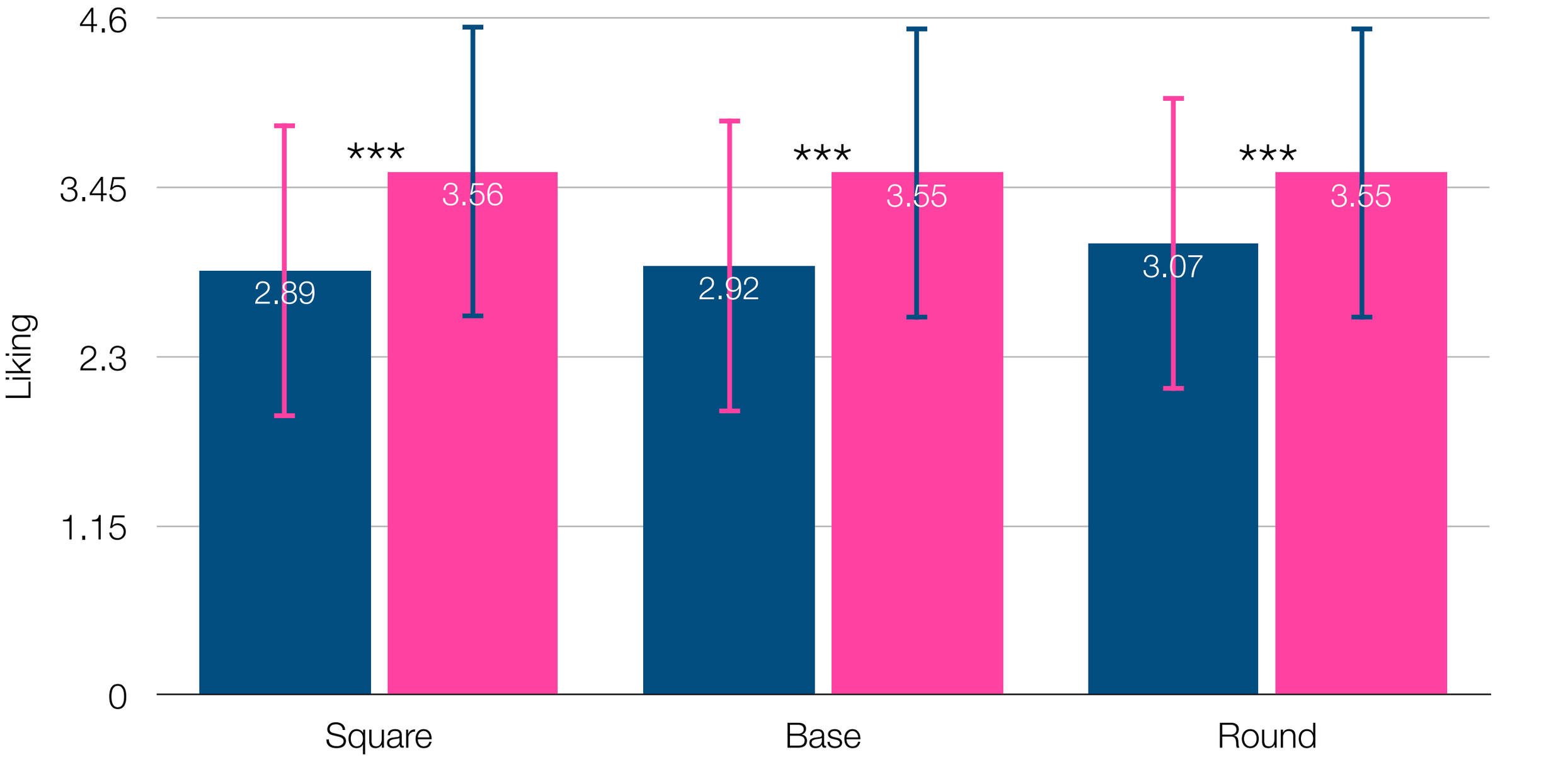
Realism vs Perceived Face Shape



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Conclusions

- The perception of physical features, strongly associated to the attribution of social features, is challenging both on screen and in immersion;
- Designing the appearance of an agent to stimulate the perception of social traits requires extreme physical traits;
- Immersion improves Liking and Realism scores irrespectively of the challenges outlined above;
- Immersion users seem to have a better experience, we just do not know what they experience.

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Thank You!

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