

The Impact of Distance, Lighting, and Disguise on Serious Errors in Eyewitness Suspect Descriptions

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Introduction

Eyewitness descriptions of previously seen criminals are often inaccurate [1], which can lead to wrongful convictions of innocents. It is unknown how often eyewitnesses make *serious* errors, such as grossly misjudging a criminal's height (e.g., 155 cm reported as 180 cm). Poor visual conditions can reduce identification accuracy [2], but little research exists on how often they lead to serious errors [3]. This study addressed this gap by examining how different visual conditions influence serious errors in eyewitness descriptions.

Method

Participants

$N = 1325$ participants (age range 5-90 years). The study was approved by the ethical committee at Åbo Akademi University (Finland). All participants were informed about the study design and received no compensation. The data collection took place at the Heureka Science Museum (Finland).

Visual Conditions

Lighting: Optimal (300-lux) vs. Suboptimal (2-lux).

Distance: 5 meters (m), 12.5m, 20m.

Disguises: None, sunglasses, hood, sunglasses & hood.

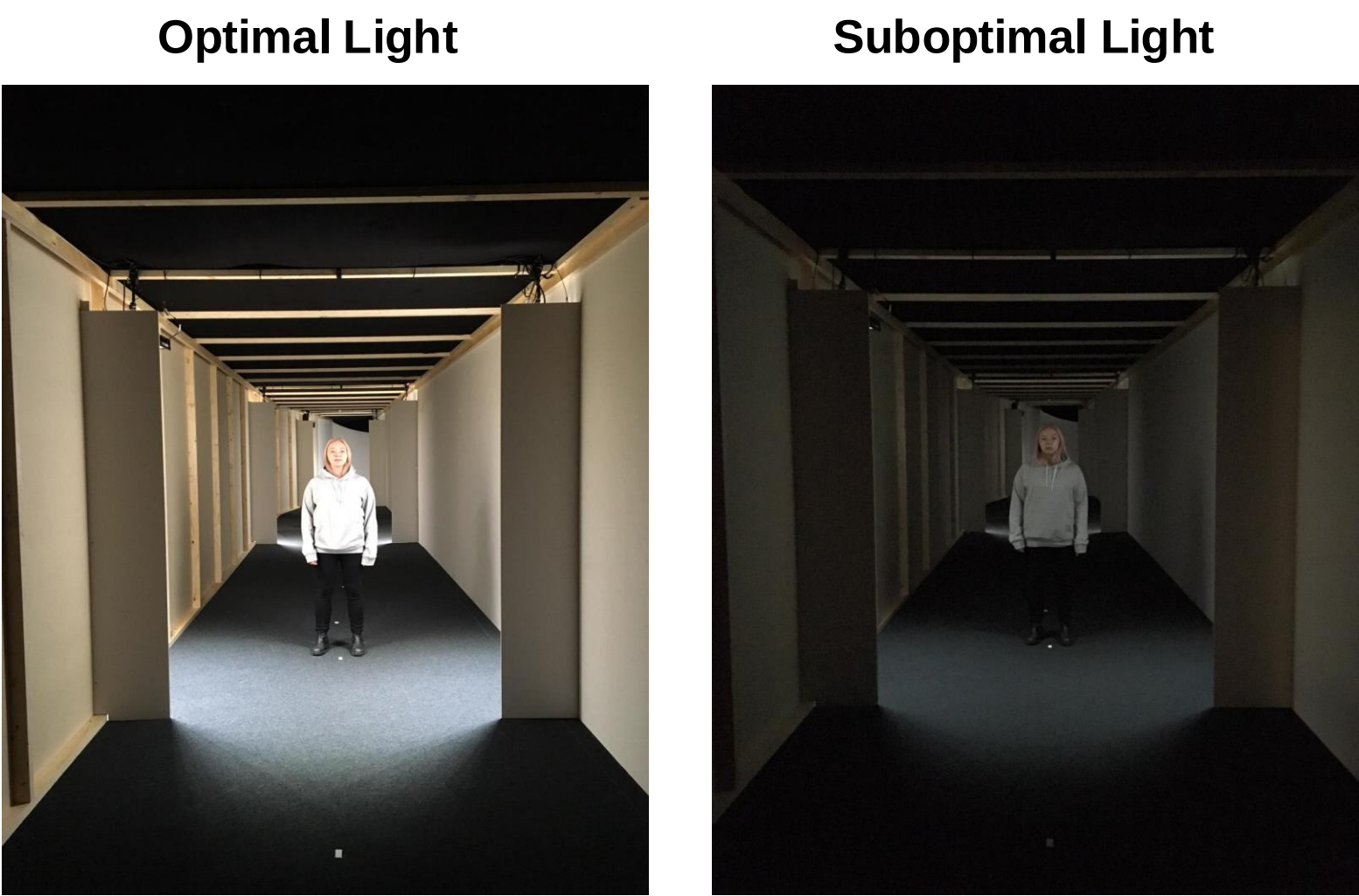
Targets: 8 targets (live actors); seven females and one male, with an average height of 166.75 cm ($SD = 6.63$), average weight of 64.50 kg ($SD = 11.67$), and average age of 25.13 years ($SD = 2.37$).

Task & Measures

Participants observed 1-4 targets, one at a time, for 20 seconds in various counterbalanced viewing conditions (see Figure 1). After each observation, participants provided numerical estimates of age, height, and weight using a sliding scale on a tablet and selected gender (male or female) from two options.

Serious Errors: Age, height, and weight errors = deviations of ± 5 units. Gender errors = incorrect estimation.

Figure 1
Illustration of the first-person view of the mock perpetrator



Note: On the left: Illustration of a mock target with no disguise at 5 meters in optimal lighting. On the right: The same target in suboptimal lighting. The target stood still, rotating their head left to right for a full view of their face. This behaviour remained the same when wearing any disguise (sunglasses, hood, or both).

Results

Descriptive Results

Across 4456 eyewitness descriptions of age, height, weight, and gender, there were 1951 serious age errors (43.7%), 2393 serious height errors (53.7%), 2734 serious weight errors (61.4%), and 191 serious gender errors (0.04%). In optimal conditions (5m, optimal lighting, no disguise), the results were almost identical.

Preliminary Results

- We ran separate multilevel logistic regressions with serious errors (age, height, weight, gender) as outcome variables and visual conditions as predictors (distance, lighting, and disguise).
- Serious errors were influenced by distance, while lighting and disguise had inconsistent effects across errors (see Table 1). However, post hoc analyses revealed few significant differences.
- Serious errors were high for age, height, and weight, and low for gender. Gender errors increased with disguise and distance, though this was not supported by post hoc analysis.

Table 1
Preliminary Analyses of the Impact of Visual Conditions on Serious Errors

Factor / Interaction	Age		Height		Weight		Gender	
	χ^2 (DF)	p-value	χ^2 (DF)	p-value	χ^2 (DF)	p-value	χ^2 (DF)	p-value
Distance	6.84(2)	.033	40.99(2)	<.001	8.73(2)	.013	21.95(2)	<.001
Lighting	1.40(1)	.236	2.37(1)	.124	2.64(1)	.104	3.45(1)	.063
Disguise	4.05(3)	.256	7.22(3)	.065	2.54(3)	.468	40.81(3)	<.001
Distance: Lighting	3.41(2)	.182	3.37(2)	.186	4.98(2)	.083	10.06(2)	.007
Distance: Disguise	16.76(6)	.010	4.99(6)	.544	8.89(6)	.180	4.02(6)	.673
Lighting: Disguise	4.72(3)	.194	1.26(3)	.738	1.21(3)	.752	2.56(3)	.465
Distance: Lighting: Disguise	6.07(6)	.415	18.99(6)	.004	1.60(6)	.953	17.00(6)	.019

Note. Chi-square (χ^2) values, degrees of freedom (DF), and p-values from multilevel logistic regressions examining the effects of distance, lighting, and disguise, on serious errors in age, height, weight, and gender estimates.

Summary & Conclusion

- This is the first study to investigate the impact of distance, lighting, and disguise on eyewitness descriptions.
- Serious errors of age, height, and weight (but not gender) were high in optimal conditions and only slightly increasing with poor conditions. More research is needed to test accuracy thresholds.
- Understanding the impact of environmental factors on eyewitness descriptions is of critical importance. This is because inaccurate eyewitness descriptions may result in the wrongful detainment and conviction of innocent individuals.

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