

VU Research Portal

Factors affecting the probability of detecting a counterfeit banknote

van der Horst, Frank

2022

document version

Publisher's PDF, also known as Version of record

[Link to publication in VU Research Portal](#)

citation for published version (APA)

van der Horst, F. (2022). *Factors affecting the probability of detecting a counterfeit banknote: attitude, situation and design*. [PhD-Thesis - Research and graduation internal, Vrije Universiteit Amsterdam]. s.n.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

E-mail address:

vuresearchportal.ub@vu.nl

Contents

1. INTRODUCTION	5
1.1 FOCUS OF THESIS	7
1.2 THEORETICAL FRAMEWORK	8
1.2.1 <i>Vision</i>	9
1.2.2 <i>Touch</i>	10
1.2.3 <i>Attention</i>	12
1.2.4 <i>Judgement and Decision-making</i>	16
1.3 STIMULUS MATERIAL (GENUINE AND COUNTERFEIT EURO BANKNOTES)	19
1.3.1 <i>Genuine euro banknotes</i>	19
1.3.2 <i>Counterfeit euro banknotes and the counterfeiter</i>	20
1.4 THE USERS	21
1.5 THESIS OUTLINE	24
2. A DUAL PROCESSING MODEL FOR ACCEPTING OR REJECTING A COUNTERFEIT (MARC)	26
2.1 MAIN CHARACTERISTICS MODEL	29
2.1.1 <i>Automatic processing, Type 1</i>	31
2.1.2 <i>Controlled processing, Type 2</i>	32
2.2 FACTORS TRIGGERING TYPE 2 PROCESSING	32
2.2.1 <i>Attitude towards cash</i>	32
2.2.2 <i>Trust in the environment</i>	34
2.2.3 <i>Banknote circulation quality in a country</i>	35
2.2.4 <i>Time pressure, distractibility</i>	35
2.2.5 <i>The detectability of the counterfeit</i>	36
2.2.6 <i>Banknote fitness</i>	37
2.2.7 <i>Experience, training</i>	37
2.2.8 <i>The visual and haptic abilities</i>	38
2.2.9 <i>Assessment of risks and benefits</i>	38
3. DOES BANKNOTE QUALITY AFFECT COUNTERFEIT DETECTION? EXPERIMENTAL EVIDENCE FROM GERMANY AND THE NETHERLANDS	40
3.1 INTRODUCTION	44
3.2 THE EXPERIMENT	46
3.2.1 <i>Recruitment of participants</i>	46
3.2.2 <i>Test sets</i>	47
3.2.3 <i>Soil distribution</i>	48
3.2.4 <i>Test setting</i>	51
3.2.5 <i>Sample size</i>	52
3.2.6 <i>External validity</i>	52
3.3 EMPIRICAL STRATEGY	53
3.3.1 <i>Hypotheses</i>	53
3.3.2 <i>Measures of respondents' performance in counterfeit detection</i>	54
3.3.3 <i>Regression analysis</i>	56
3.4 SAMPLE AND DESCRIPTIVE STATISTICS	57

3.4.1 Consumers	57
3.4.2 Cashiers.....	59
3.4.3 Descriptive statistics on the level of sets and stacks	59
3.5 REGRESSION RESULTS	61
3.5.1 H1: Hit rate	61
3.5.2 H2: Sensitivity	63
3.5.3 H3: Bias.....	65
3.6 CONCLUSIONS AND RECOMMENDATIONS.....	67
4. FINDING COUNTERFEITED BANKNOTES: THE ROLES OF VISION AND TOUCH.....	70
4.1 INTRODUCTION	74
4.1.1 Two decision systems	74
4.1.2 About time	76
4.1.3 Touching on touch.....	77
4.2 METHOD EXPERIMENT 1: 'LOOKING' (SCREEN TEST)	80
4.2.1 Participants	80
4.2.2 Stimuli.....	81
4.2.3 Procedure.....	82
4.3 METHOD EXPERIMENT 2: 'FEEL' AND 'LOOK AND FEEL' (PHYSICAL TEST).....	84
4.3.1 Participants	84
4.3.2 Stimuli and procedure.....	84
4.4 PERFORMANCE ANALYSIS	85
4.5 RESULTS.....	86
4.5.1 Results Experiment 1 (vision)	86
4.5.2 Results Experiment 2 (physical test).....	88
4.5.3 Results of Experiments 1 and 2 combined	89
4.5.4 Response biases.....	90
4.6 GENERAL DISCUSSION.....	90
Annex Instructions for study Instant or in hand: physical part.....	93
5. ENHANCING COUNTERFEIT DETECTION BY GUIDING ATTENTION TO SECURITY FEATURES AND BY MANIPULATING TARGET PREVALENCE	94
5.1 INTRODUCTION	98
5.1.1 Attentional processes in counterfeit detection	100
5.1.2 The impact of trust.....	101
5.1.3 The present study	102
5.2 METHOD	103
5.2.1 Participants	103
5.2.2 Design	103
5.2.3 Stimuli.....	103
5.2.4 Procedure.....	105
5.3 RESULTS.....	106
5.3.1 Verifying the manipulation of Trust.....	107
5.3.2 Central analyses	107
5.4 GENERAL DISCUSSION.....	109
APPENDIX	111
6. CONCLUSIONS.....	114

6.1	DUAL PROCESSING MODEL FOR ACCEPTANCE OF COUNTERFEITS	117
6.2	FUTURE PERSPECTIVES	118
6.2.1	<i>Attention-guiding features</i>	118
6.2.2	<i>Familiarity of features</i>	119
6.2.3	<i>Features in good proportion to banknote design</i>	120
6.2.4	<i>Features that provide feedback</i>	120
6.2.5	<i>Attractive</i>	121
6.2.6	<i>Clear (unambiguous) features</i>	121
6.2.7	<i>Concise naming</i>	122
6.3	LIMITATIONS	122
6.4	CONTRIBUTION	124
	REFERENCES	127
	SUMMARY	137
	NEDERLANDSTALIGE SAMENVATTING	141
	ACKNOWLEDGEMENTS	145
	ABOUT THE AUTHOR	147
	LIST OF THE AUTHOR'S PUBLICATIONS	147