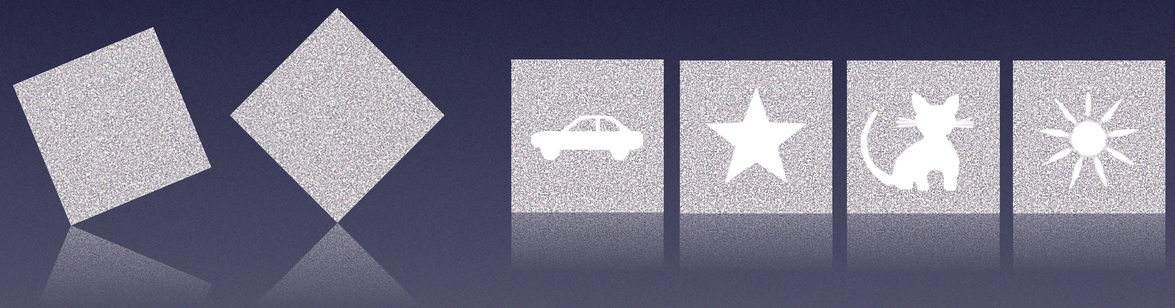
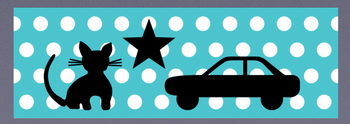
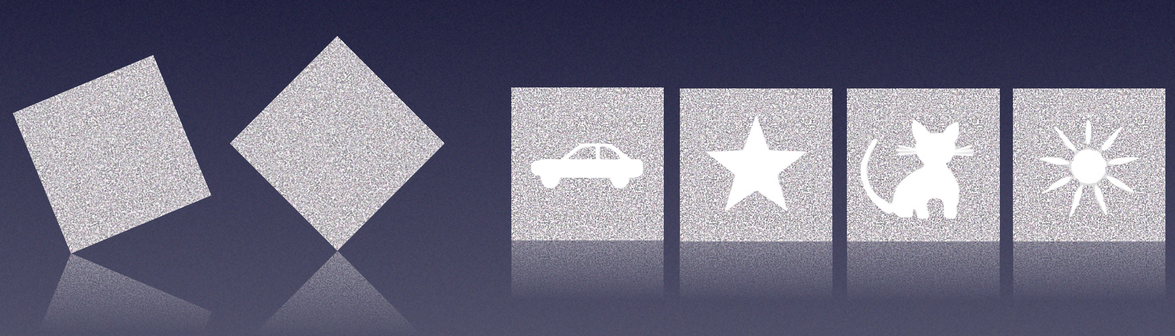
LANG-STEREOPAD®



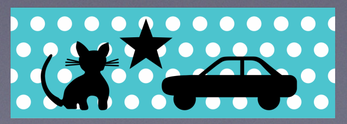
LANG-STEREOTEST®



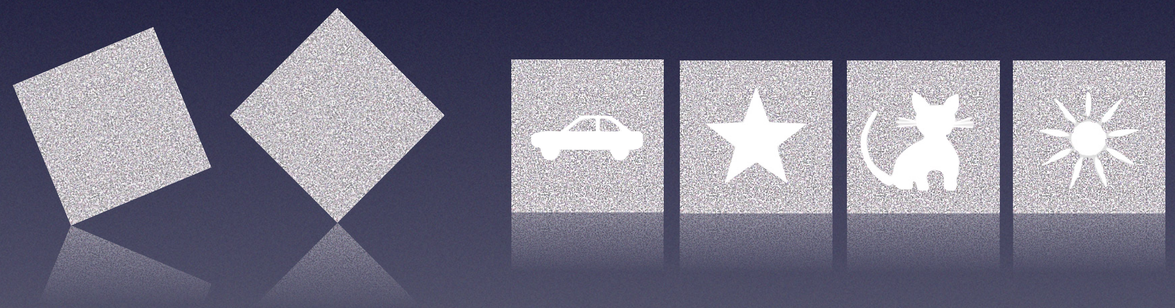
新しいグローバルな立体視力検査



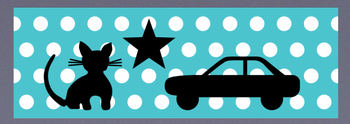
LANG-STEREOTEST®



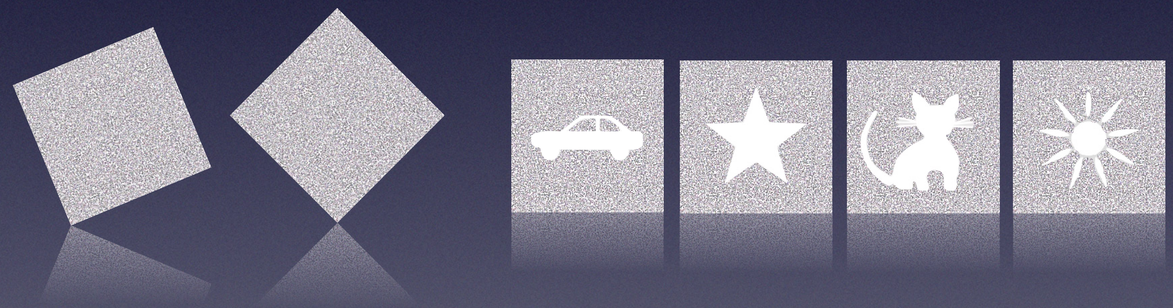
LANG-STEREOPAD®



LANG-STEREOTEST®

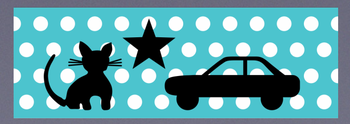


システムの特徴-検査のチュートリアル-RESULT（臨床結果）



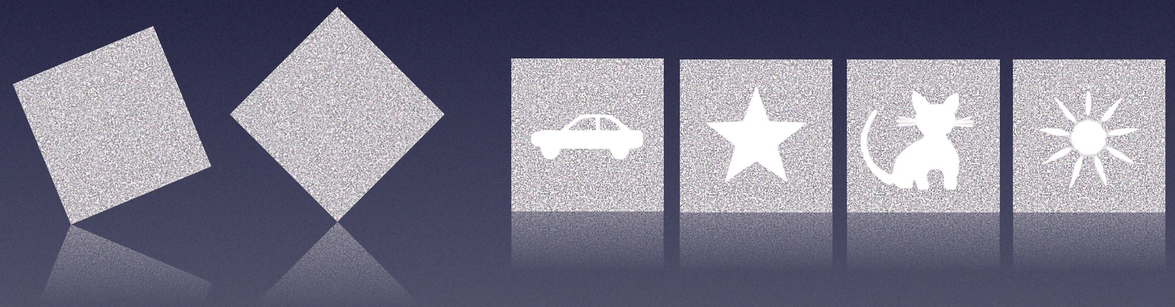
LANG-STEREOPAD®

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LANG-STEREOPAD®は、グローバルな立体視力の新しい検査システムです。

LANG-STEREOTESTS I及びIIと同様、 一般的なステレオテストとは対照的に、特別な眼鏡を必要とせず、単眼手がかりも有りません。
ランダムドットによる図形と、レンチキュラレンズを組み合わせた6枚の独立したカードを持つこのステレオテストは、立体視力評価のためのより洗練された可能性を提供します。

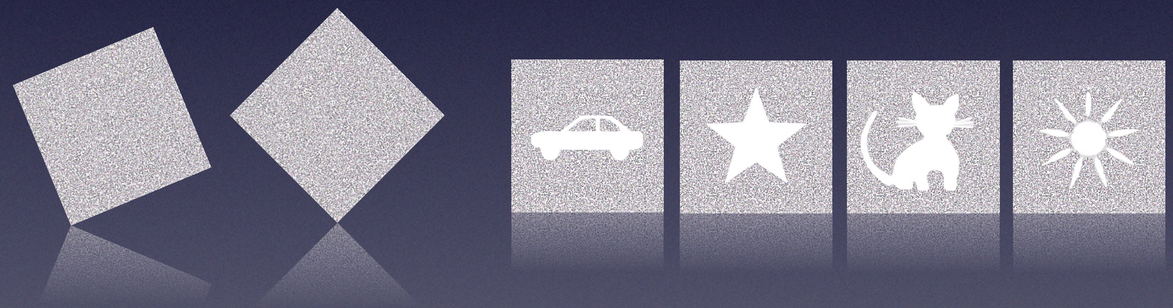


LANG-STEREOPAD®

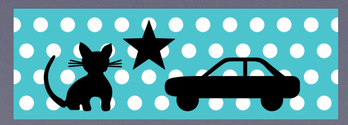


主な特徴　1. :

- レンチキュラー システムにより、特別な眼鏡は必要なし
- ランダムドットを採用し、単眼手掛かりがない
- 視差は1000 ″から50″まで6種類のテストカードをもつ

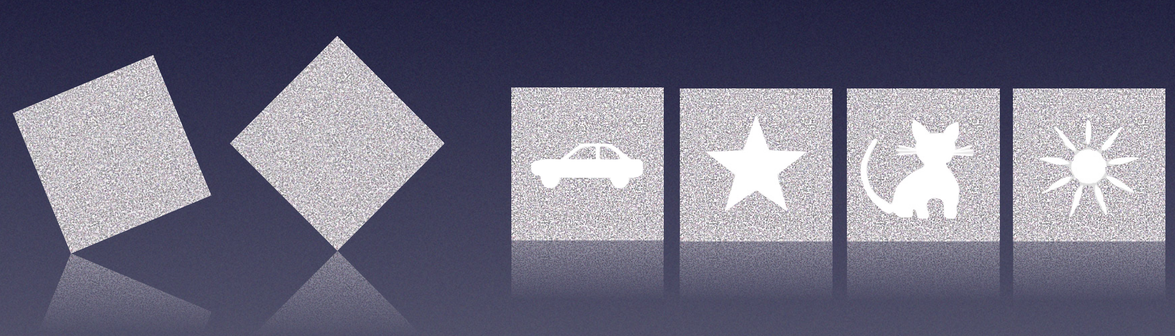


LANG-STEREOPAD®



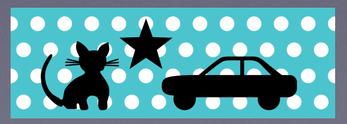
主な特徴　2.：

- テストカードは磁気を持ち、テストパネルに貼りつけて提示
- レンチキュラレンズの特徴を生かし、テストカード回転による表示、非表示の組合せアレンジ
- PREFERENTIAL LOOKING法を基本とした検査のアレンジ

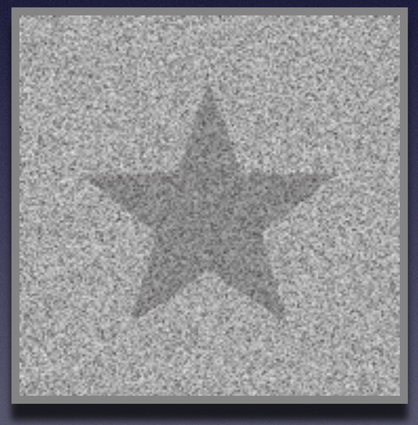


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5種類の絵を採用　視差の異なる6枚一組の
ランダムドット＆レンチキュラレンズのテストカード



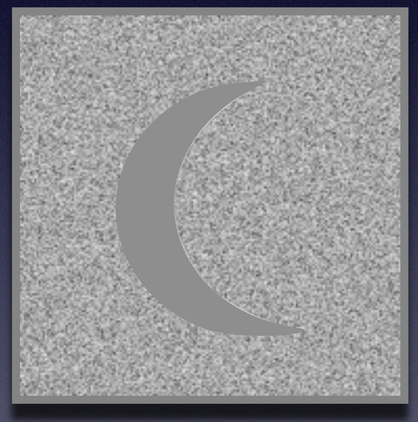
1000″



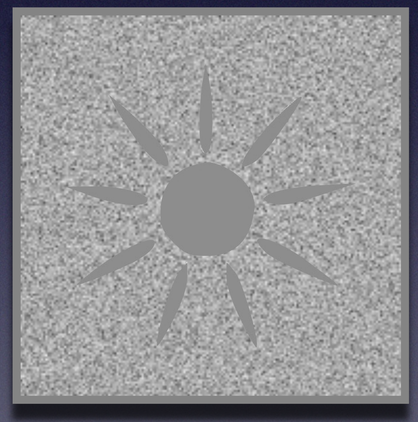
600″



400″



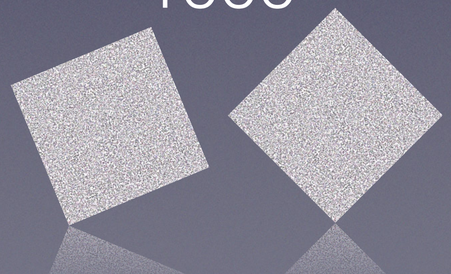
200″

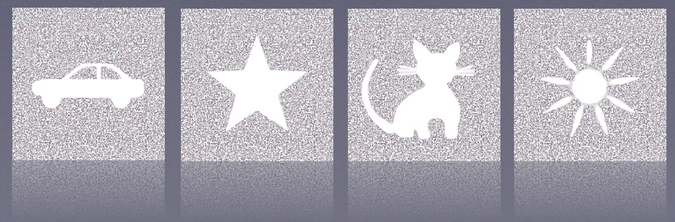


100″

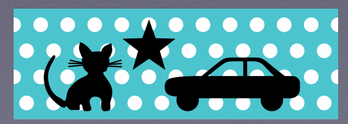


50″





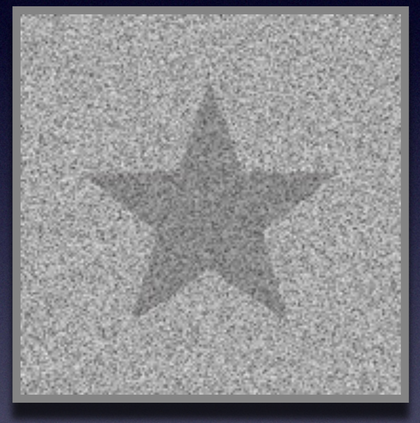
LANG-STEREOTEST®



MAGNETIC LENTICULAR TEST CARDS

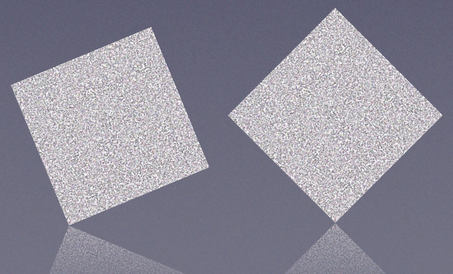
星の1000″と車の600″の視差を持つテストカードのみ、僅かに荒いランダムドットを採用

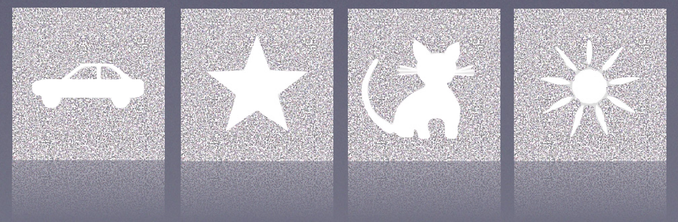
STAR 1000″



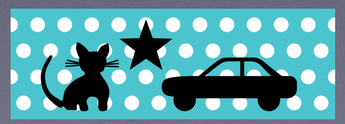
CAR 600″







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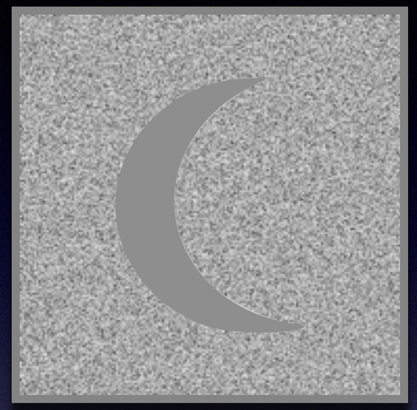
MAGNETIC LENTICULAR TEST CARDS

他の4枚のテストカードは
細かいランダムドットで構成されています

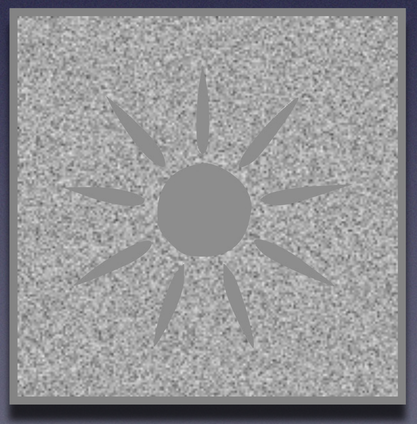
CAT 400″



MOON 200″

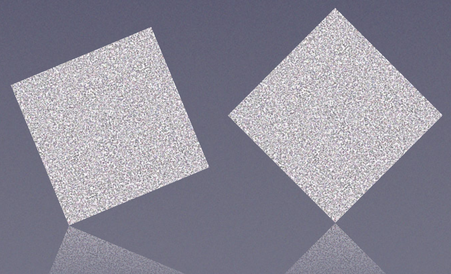


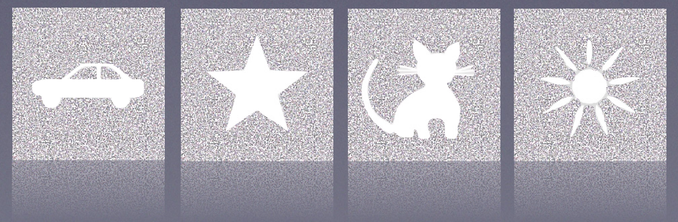
SUN 100″



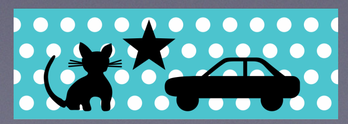
STAR 50″







LANG-STEREOTEST®



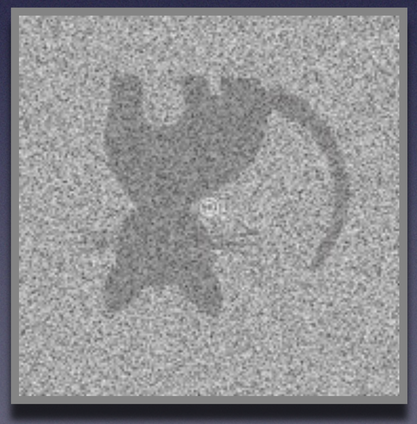
LENTICULAR GRID ORIENTATION

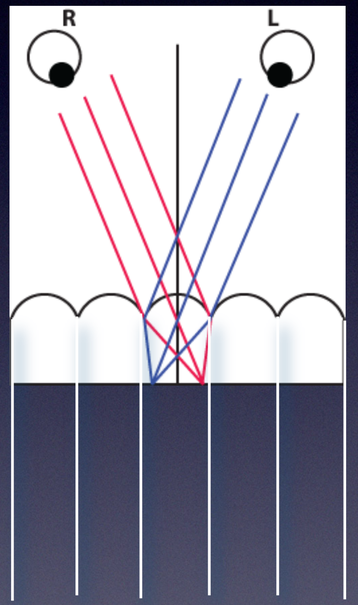
レンチキュラーレンズは、溝が垂直に並んだ場合にのみ、立体視が可能となります

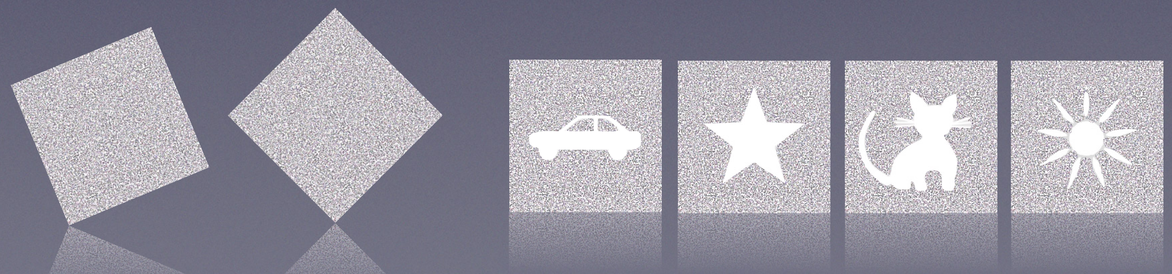
グリッドを垂直にすることで認識可能となる



絵は逆になるがグリッドは垂直なので認識可能





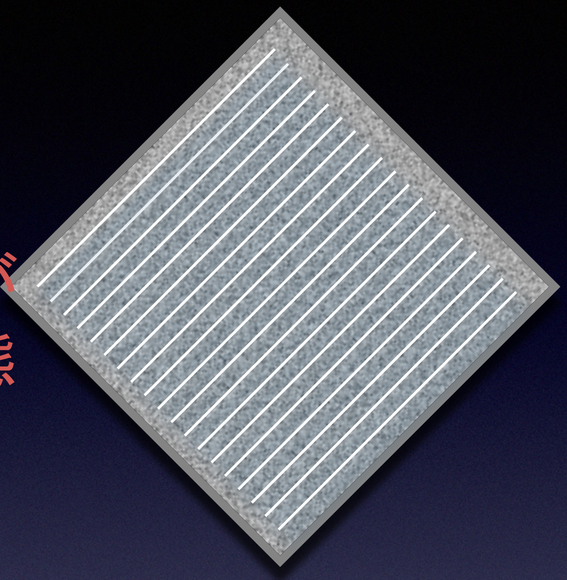


LANG-STEREOTEST®

LENTICULAR GRID ORIENTATION

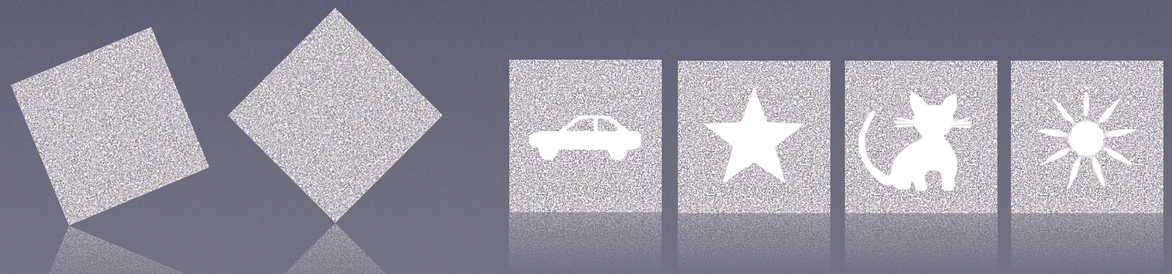
レンチキュラレンズは、レンズが垂直でないと絵を知覚することはできません!

グリッドが斜めの状態

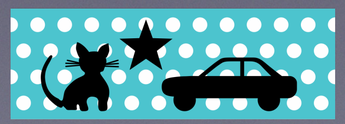


グリッドが水平の状態



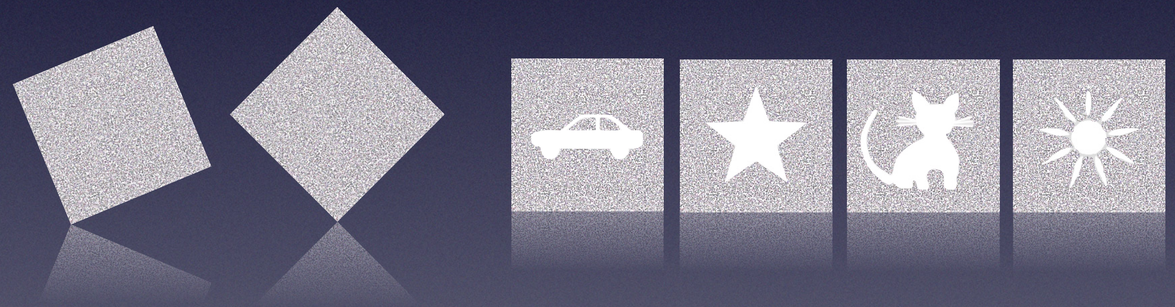


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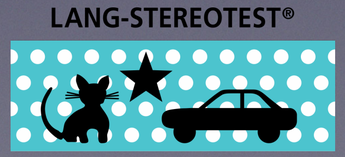


次のチュートリアルでは、3つの評価方法が提示されています

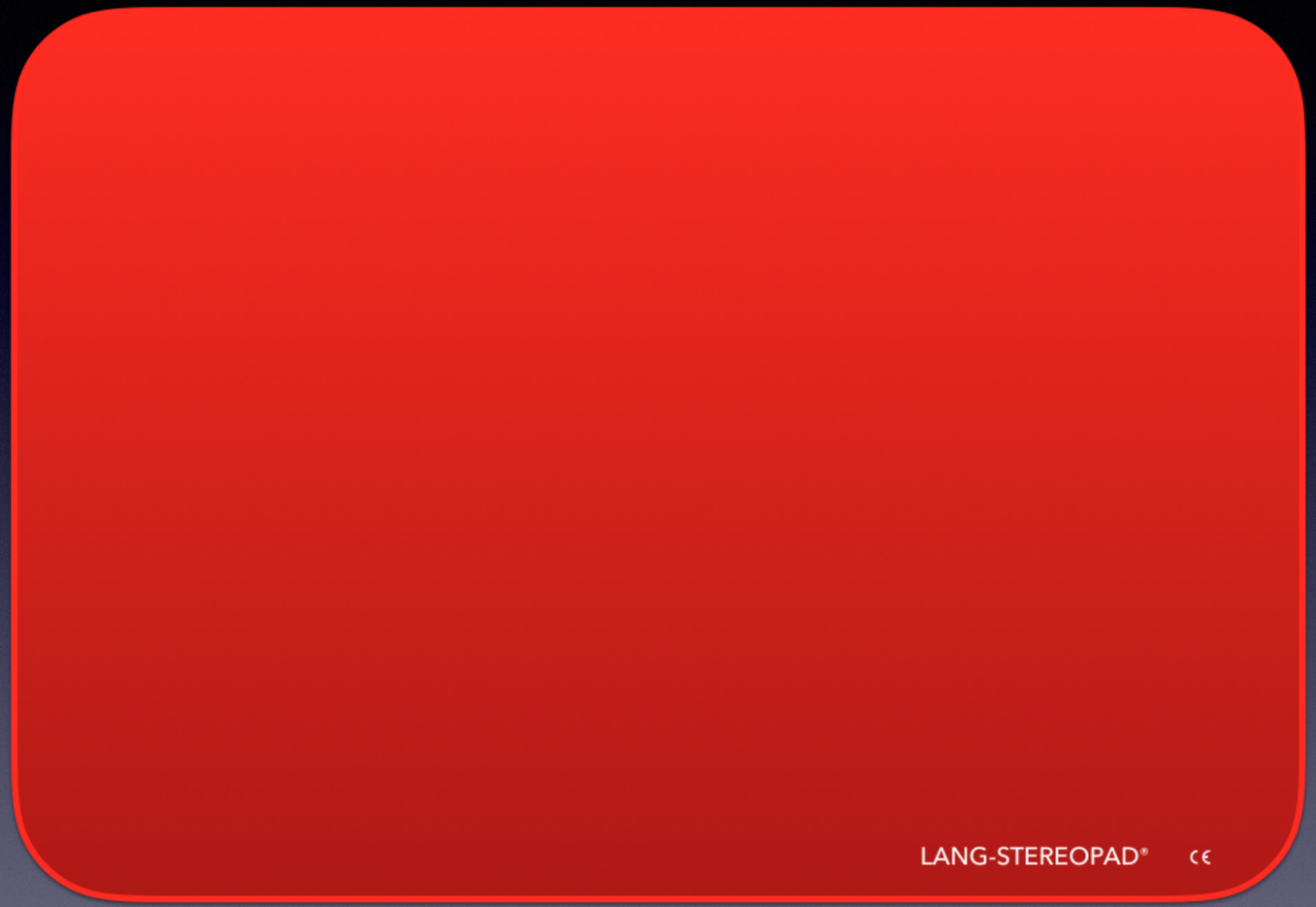
- 2つの確認ステップによる立体視の簡単なスクリーニング
- 2枚のテストカードを使用したPL法
- 6枚のテストカードを使用した立体視視力の測定



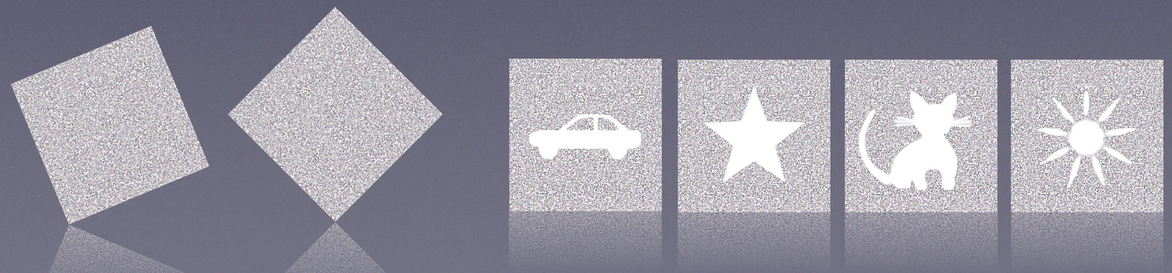
LANG-STEREOPAD®



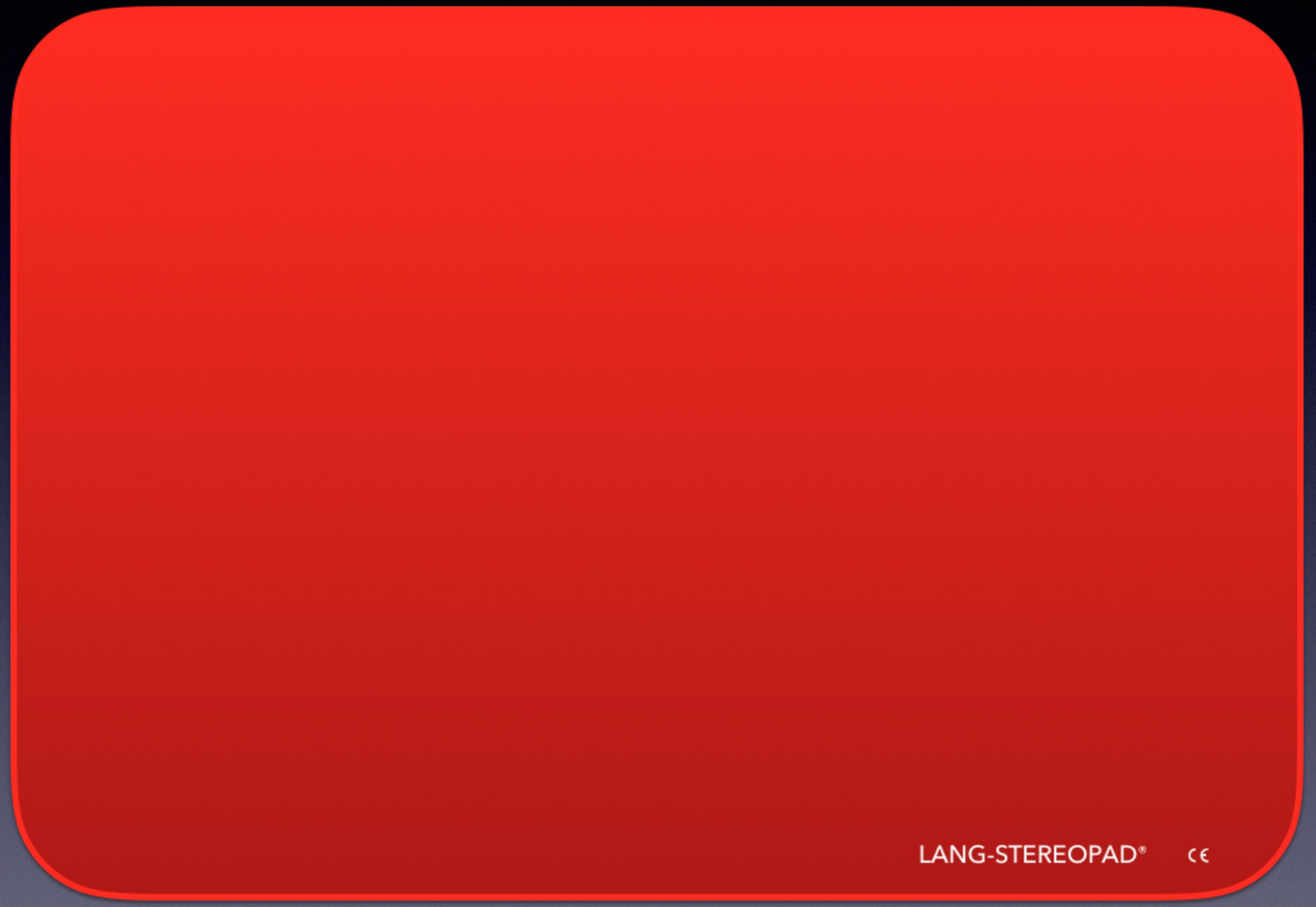
テストパネルは両面が利用可能であり、2つのポジションが使える





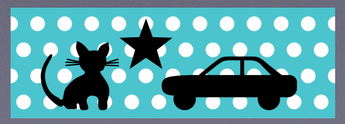


立体視の簡単なスクリーニング

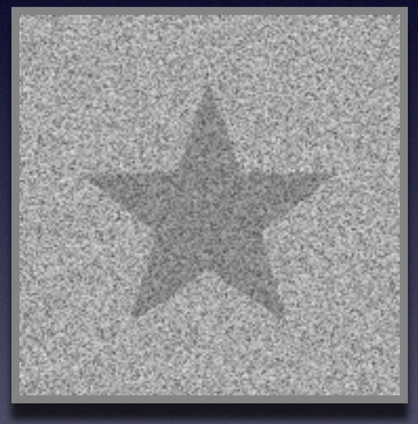


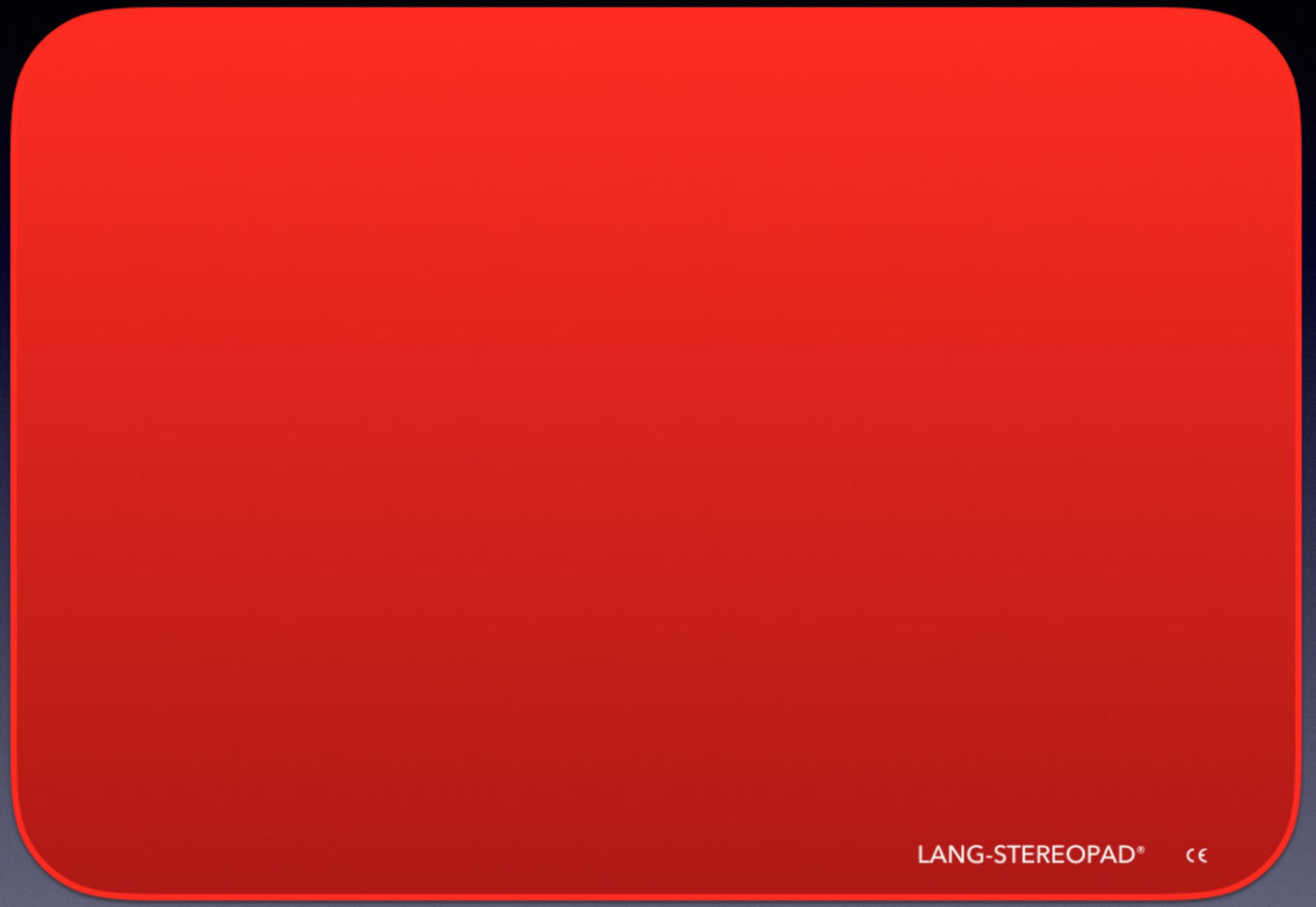


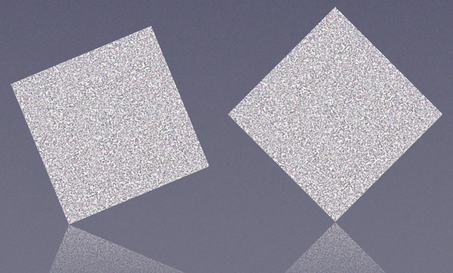
LANG-STEREOTEST®

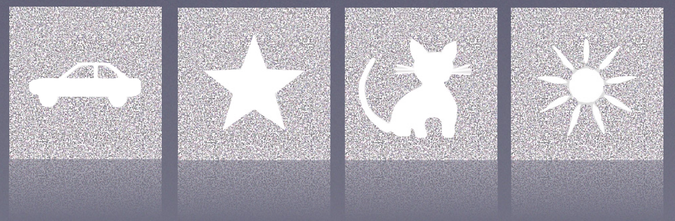


視差の大きな一枚のカードを用意します



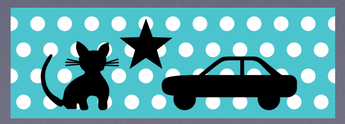




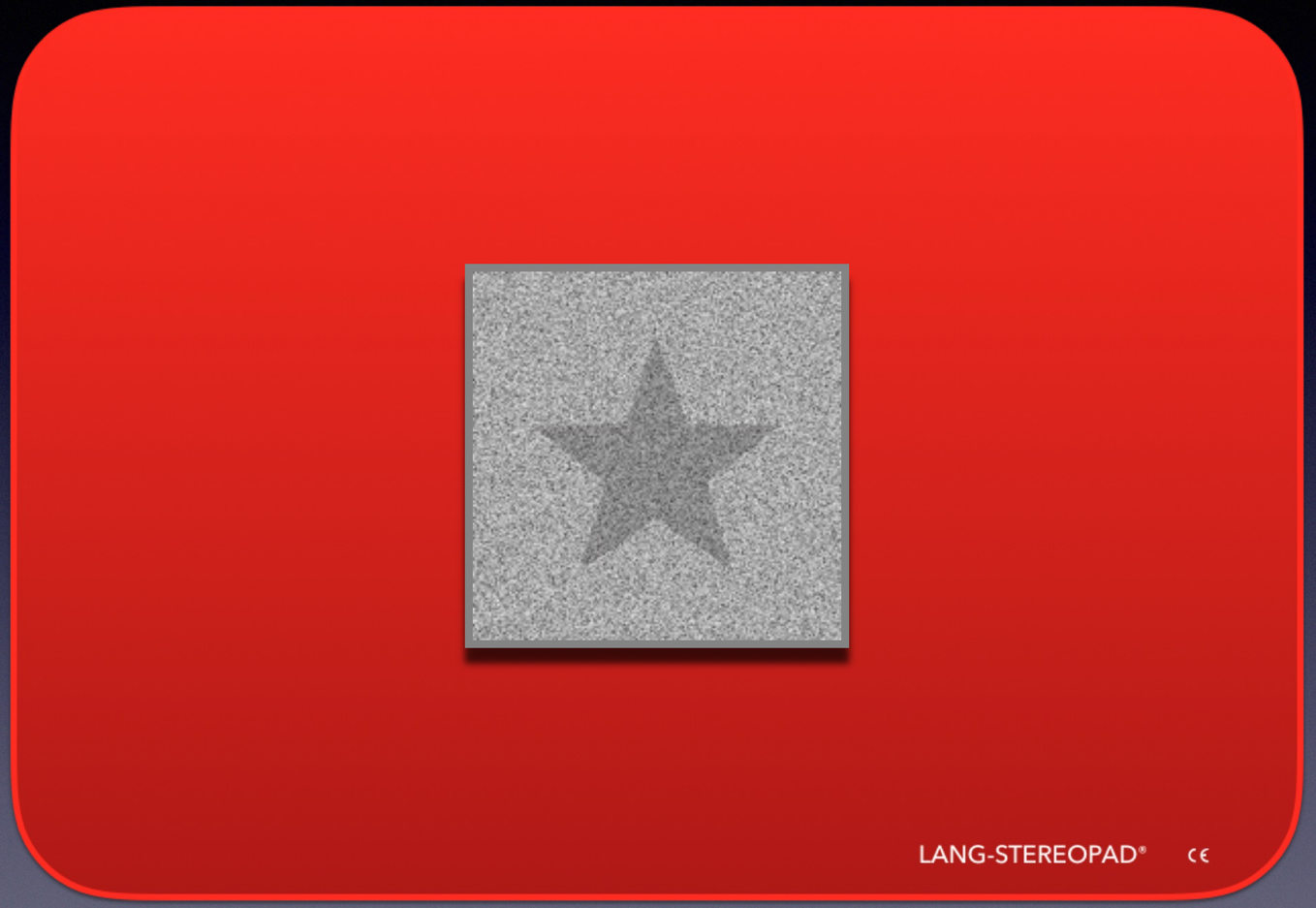


SCREENING

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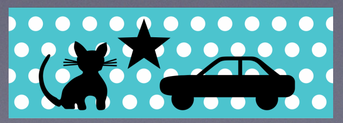
視差の大きな一枚のカードを提示してください



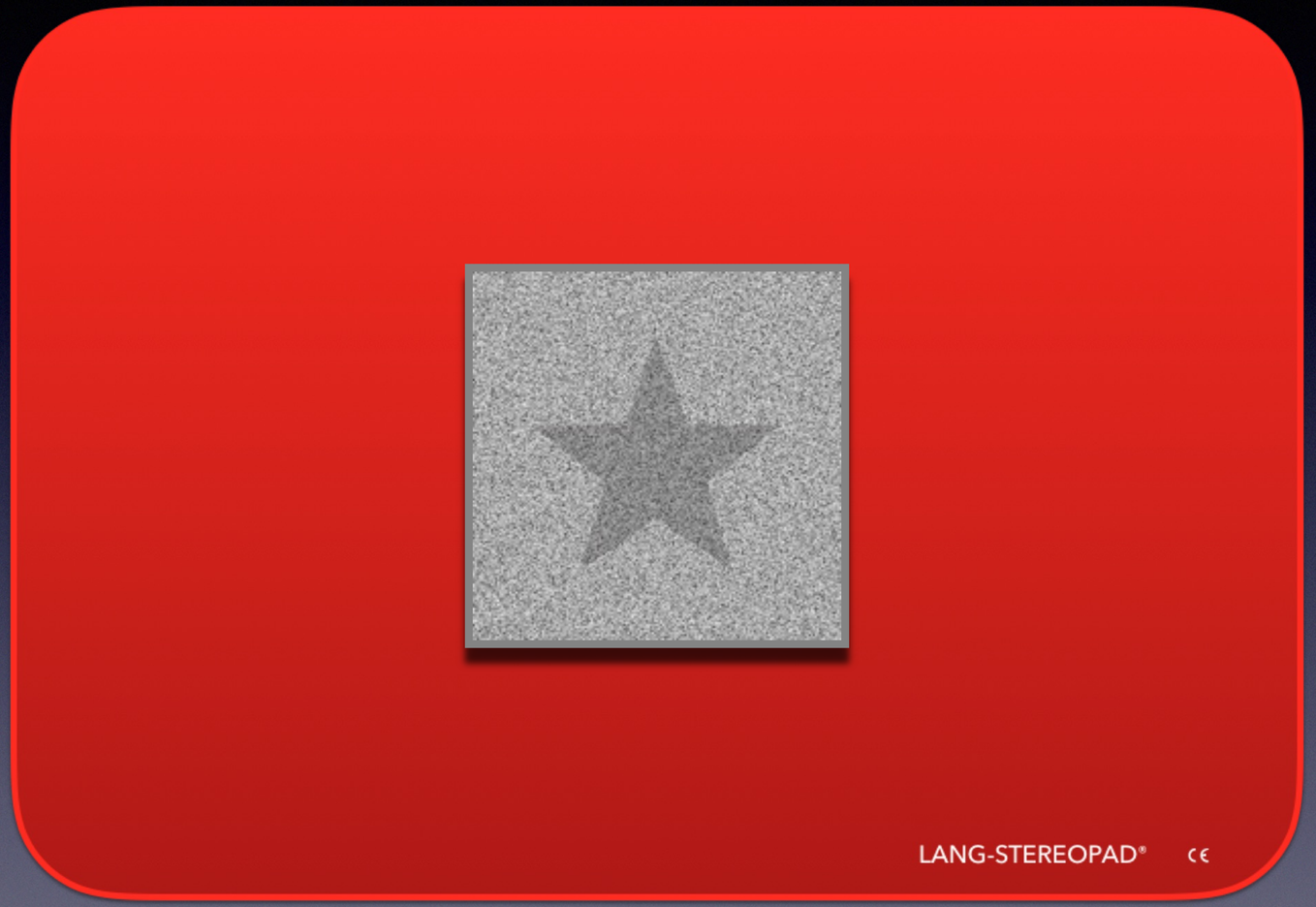


SCREENING

LANG-STEREOTEST®



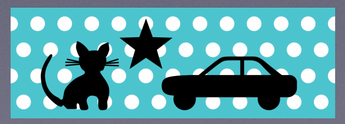
被検者に「何が見えますか？」と質問します



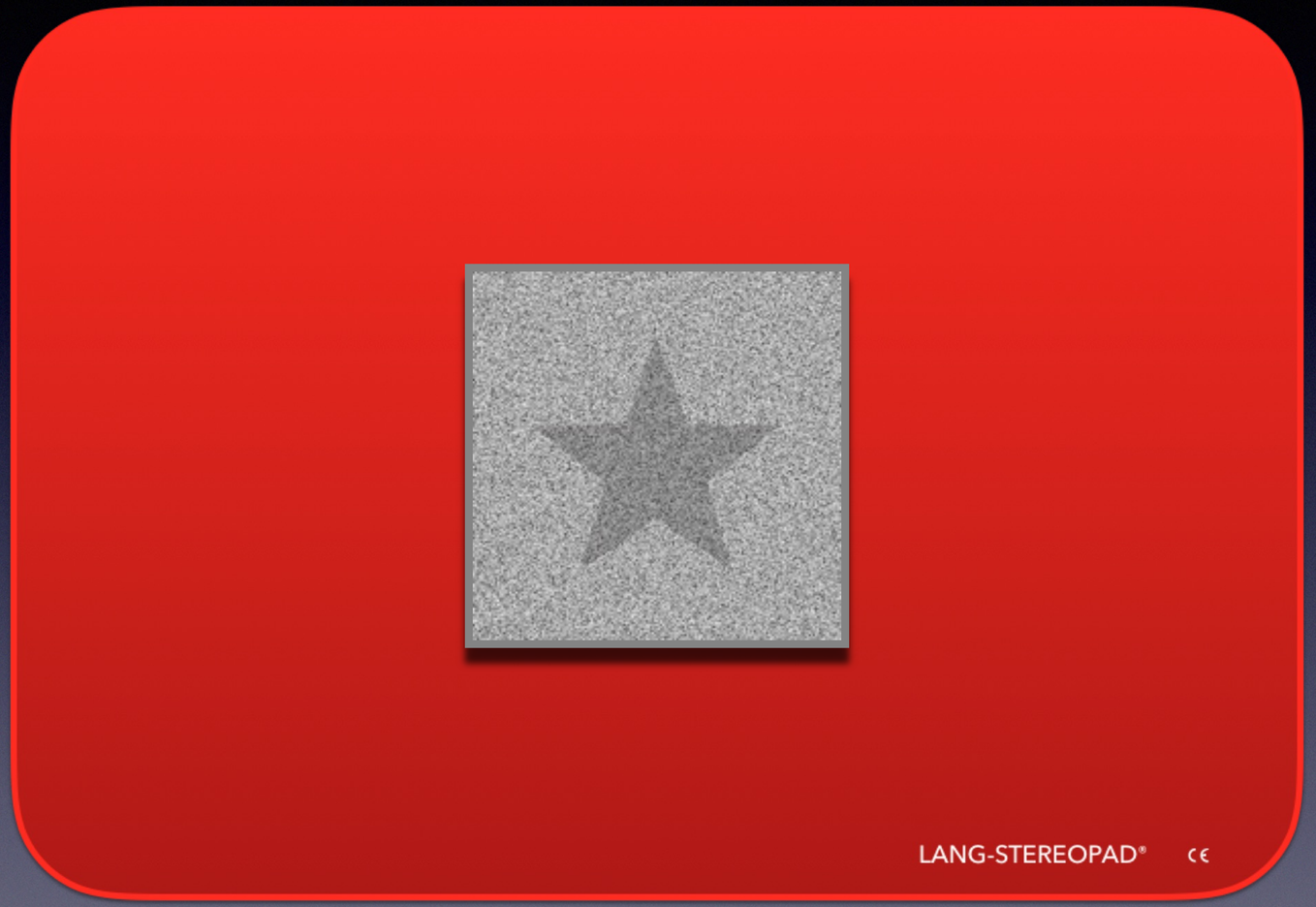


SCREENING

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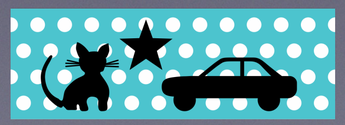
正しい答えは　「星が見える」と回答するでしょう



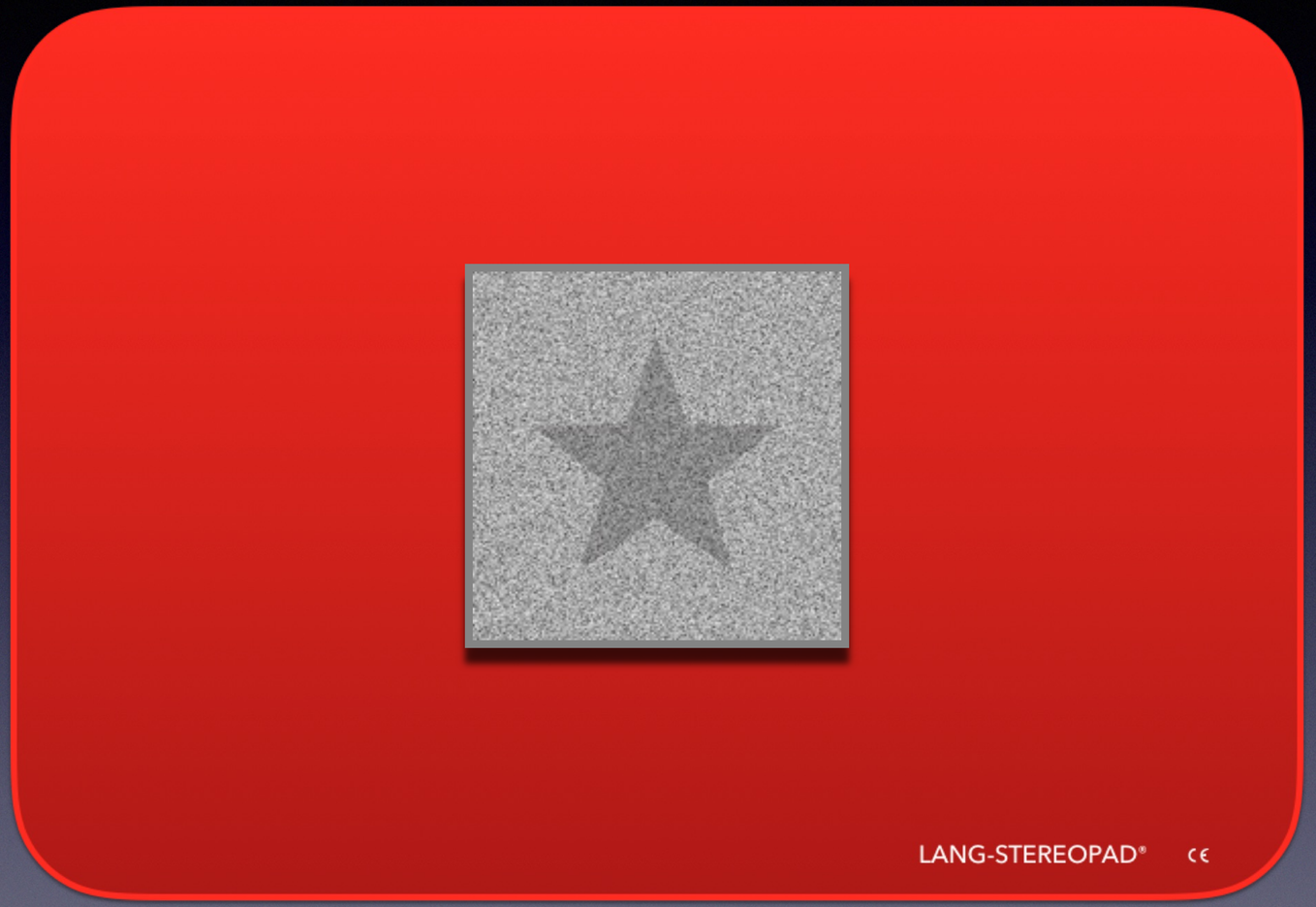


SCREENING

LANG-STEREOTEST®



確認ステップ 1: テストパネルを90°
回転させてポートレイトポジションにする用意をします



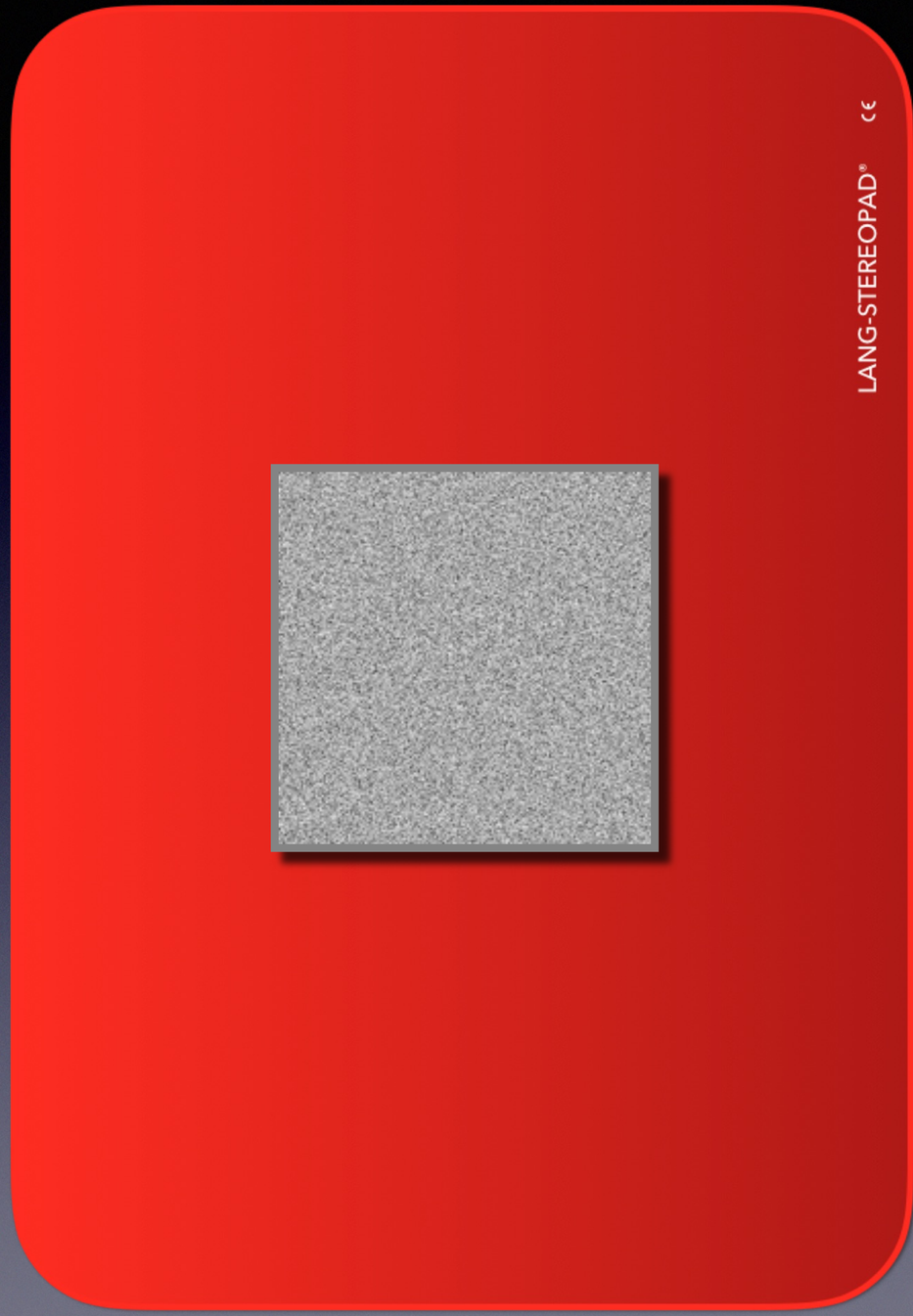


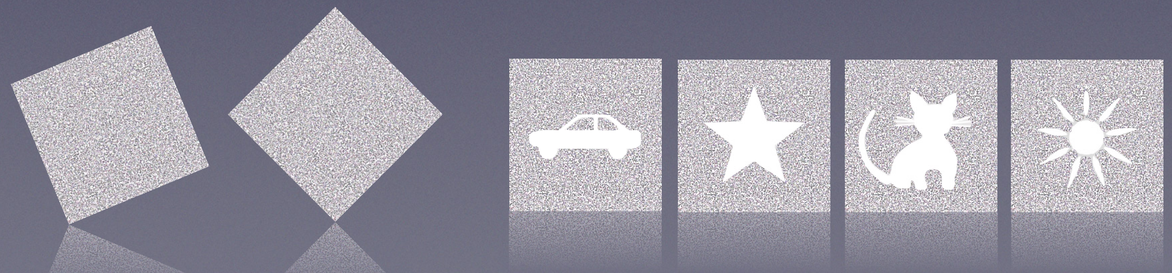
SCREENING

LANG-STEREOTEST®

スクリーニング

ポートレイトポジション

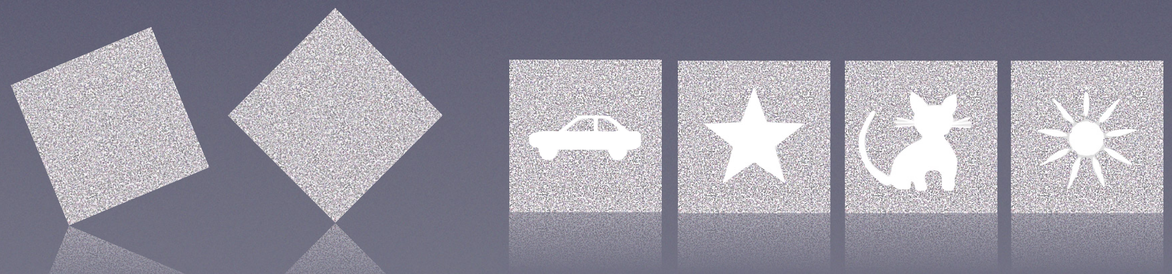


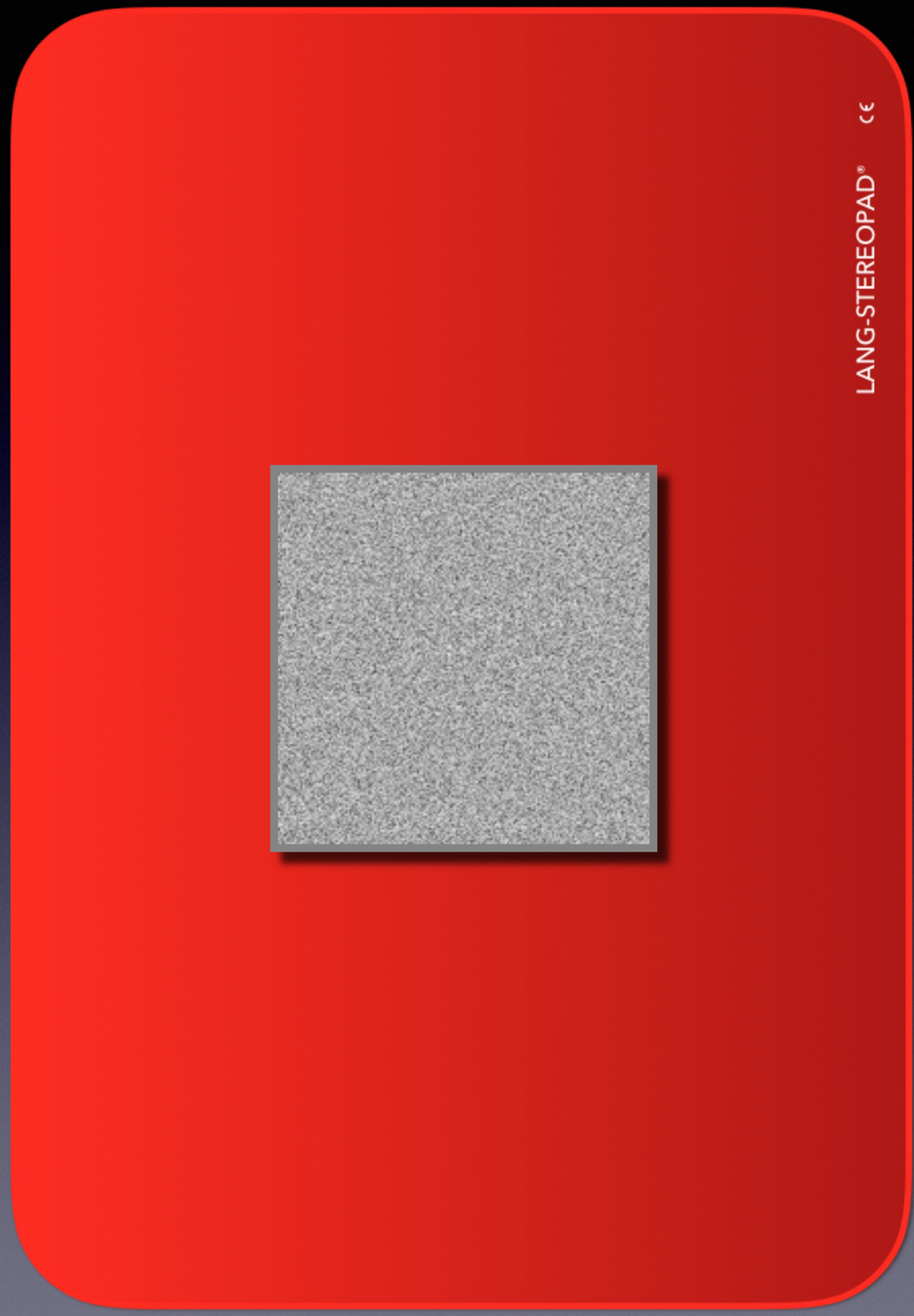


LANG-STEREOTEST®

スクリーニング

被検者に質問します
「何が見える?」

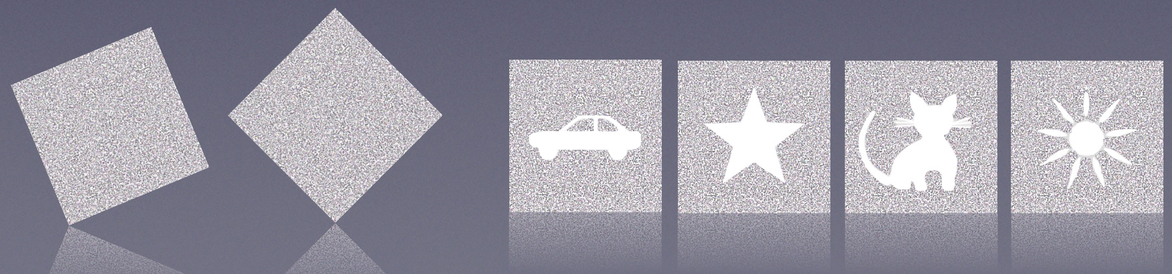


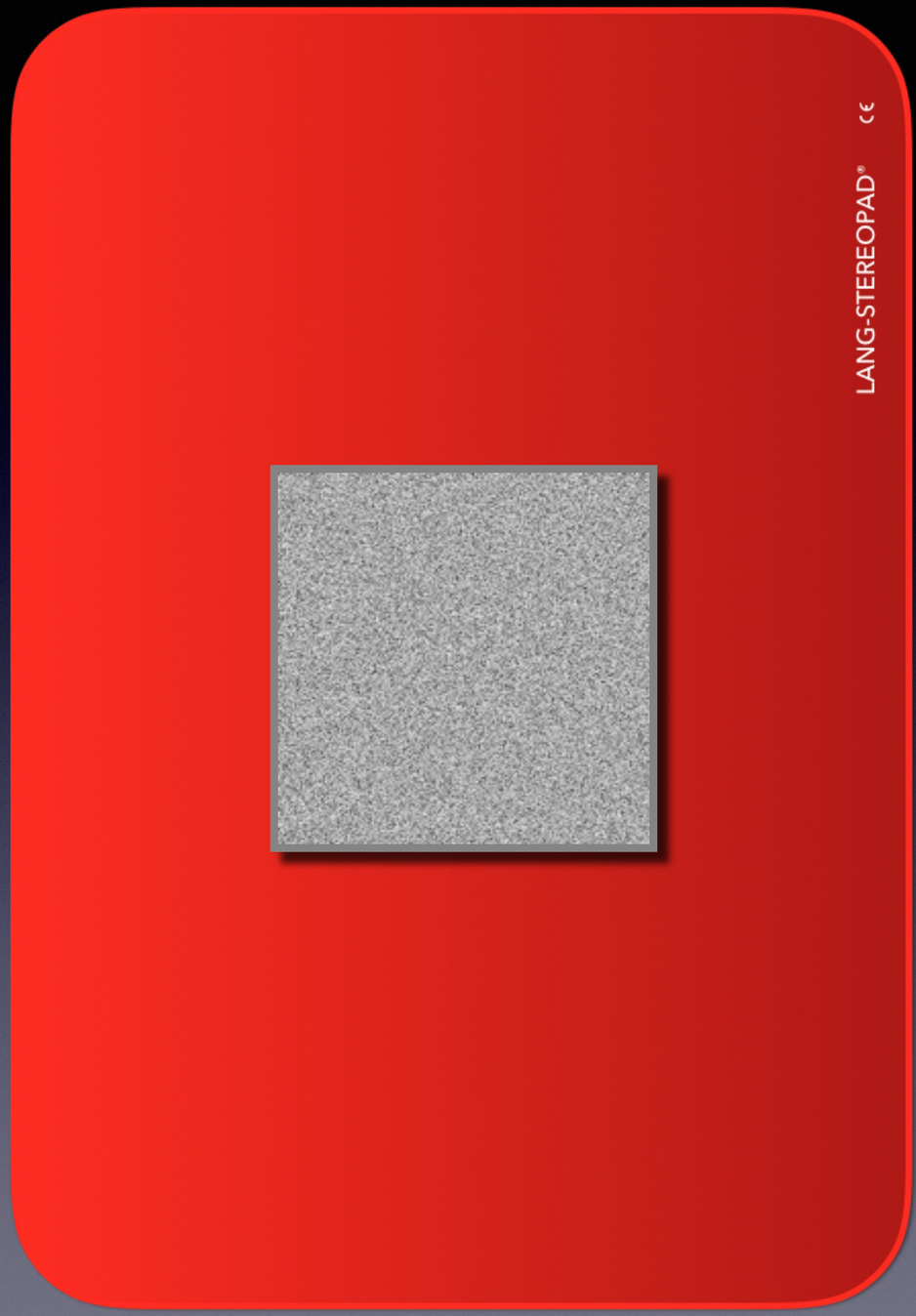


LANG-STEREOTEST®

スクリーニング

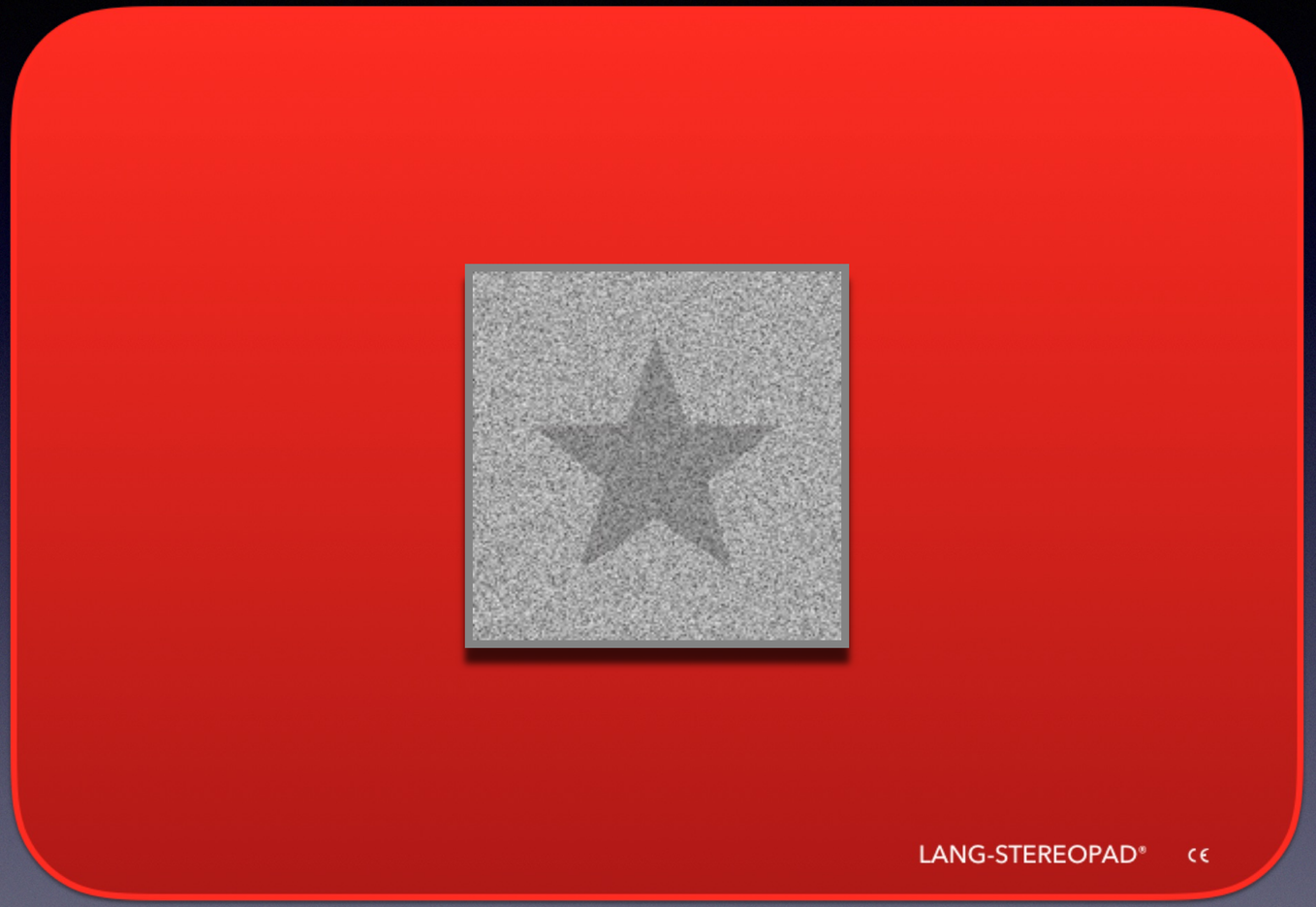
正しい答えは
「何も見えない!」





LANG-STEREOTEST®

確認ステップ 2: 別のテストプレートを加える用意をします



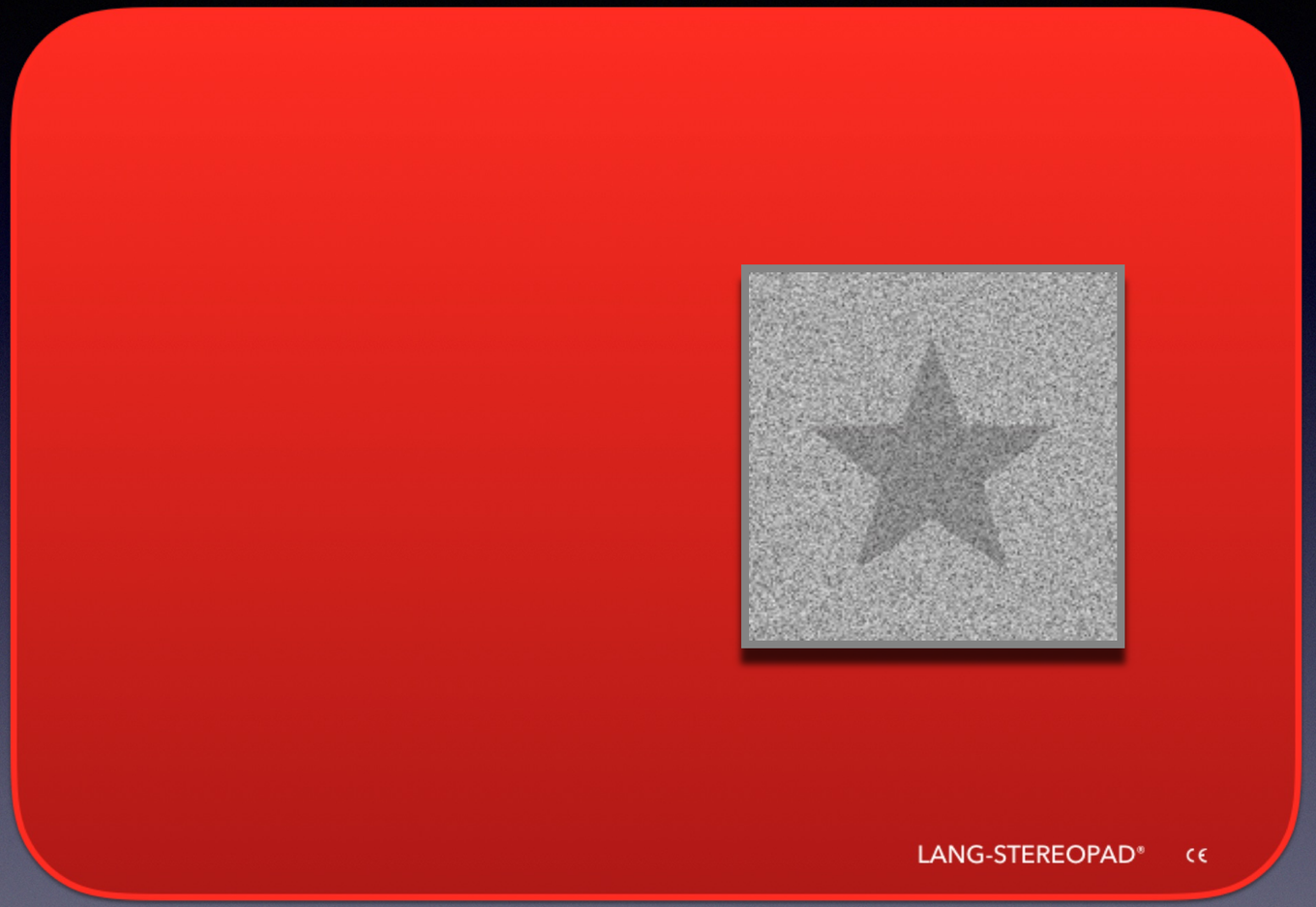


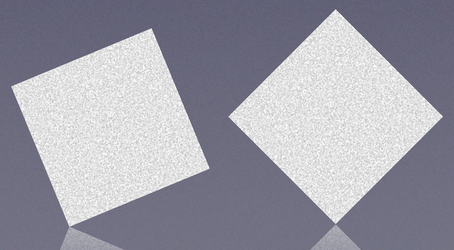
SCREENING

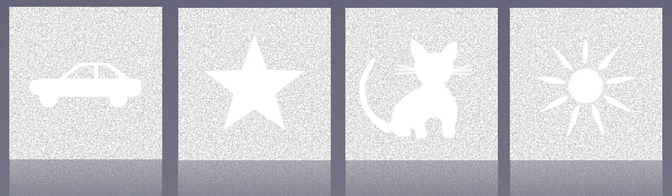
LANG-STEREOTEST®

確認ステップ 2: 視差の小さいテストカードを加えます





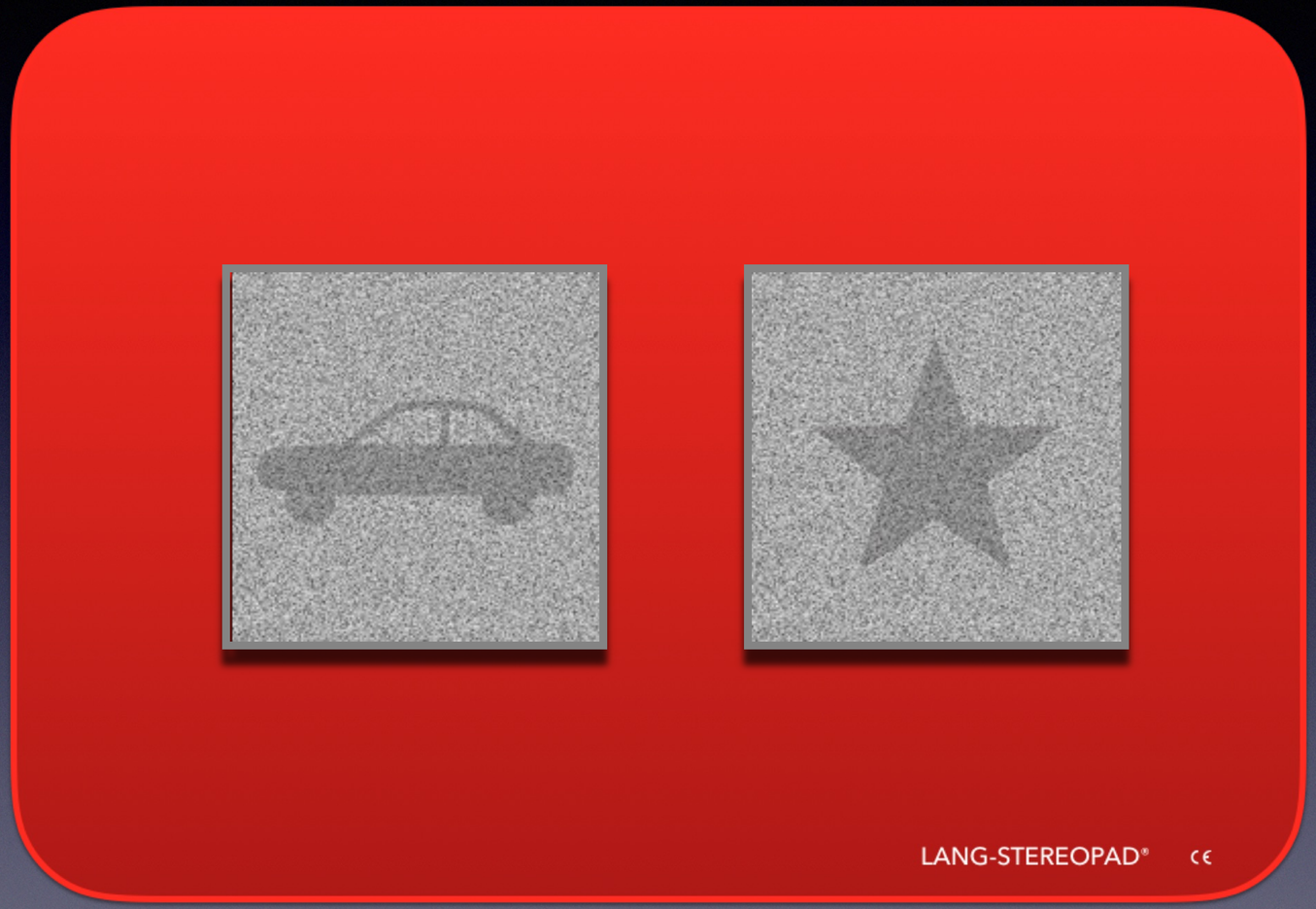




SCREENING

LANG-STEREOTEST®

確認ステップ2:視差の小さなテストカードを加えます

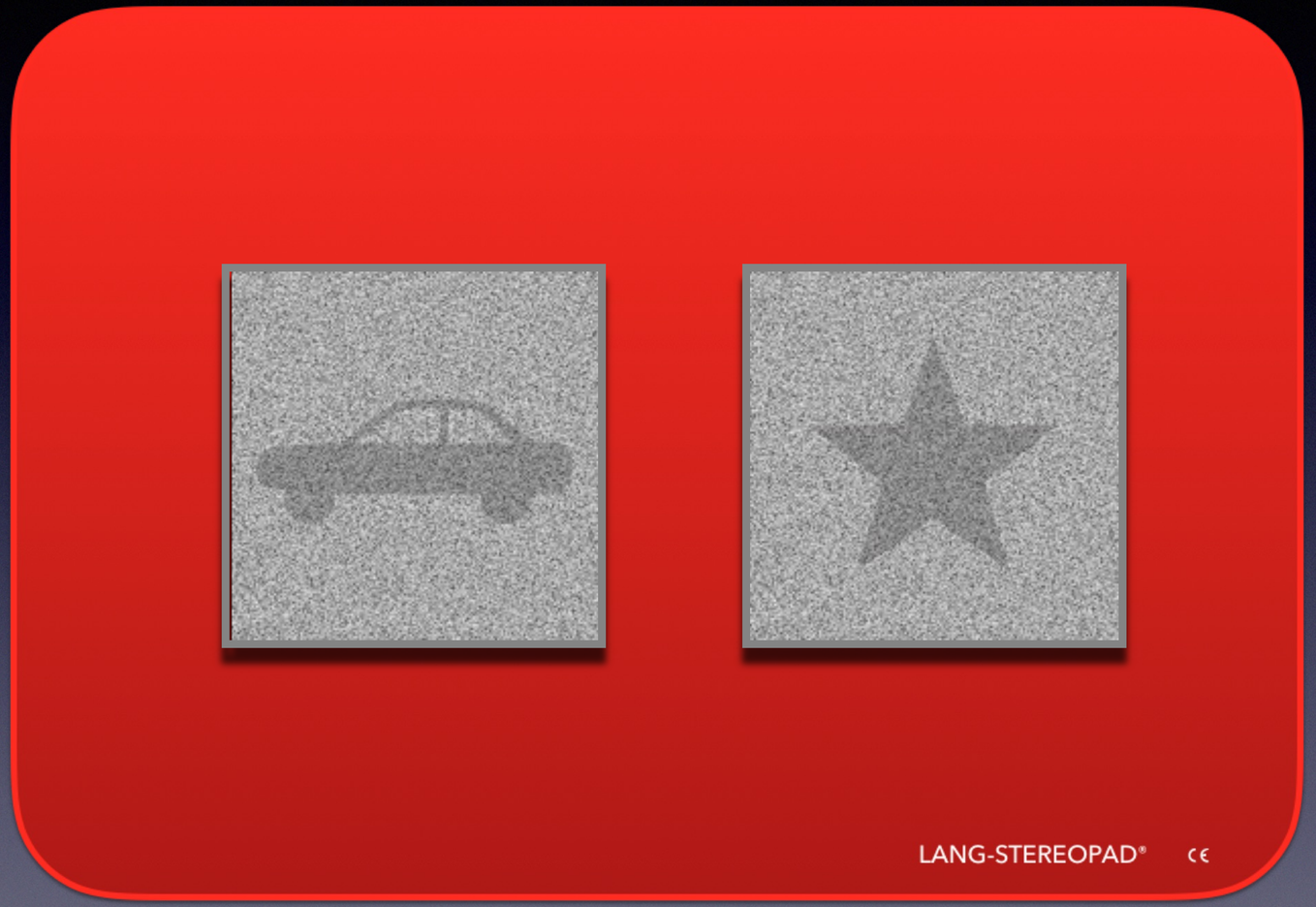




SCREENING

LANG-STEREOTEST®

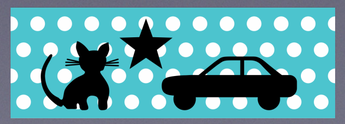
被検者に質問します:「 何が見える?」



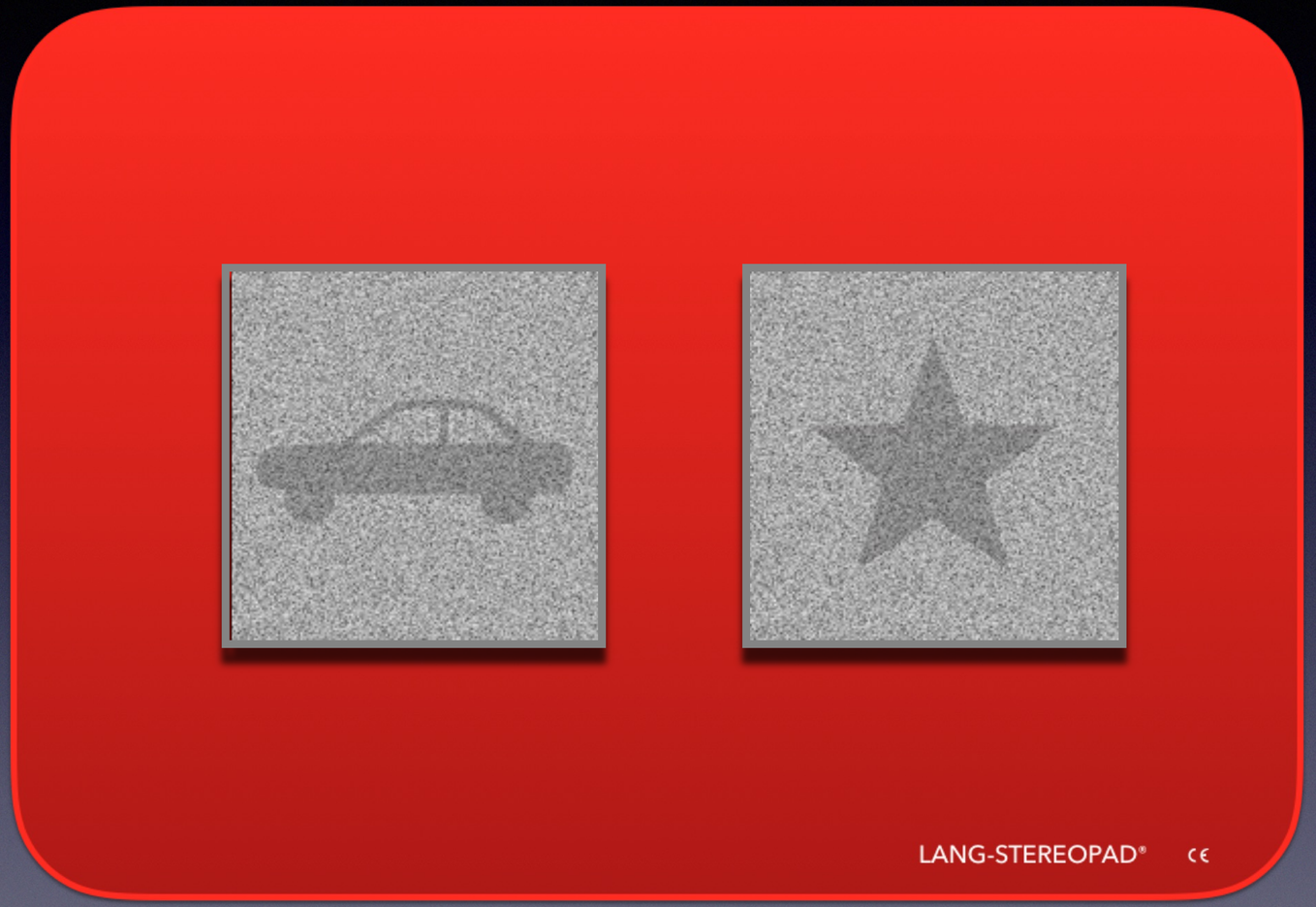


SCREENING

LANG-STEREOTEST®



正解の回答:「車と星が見える」

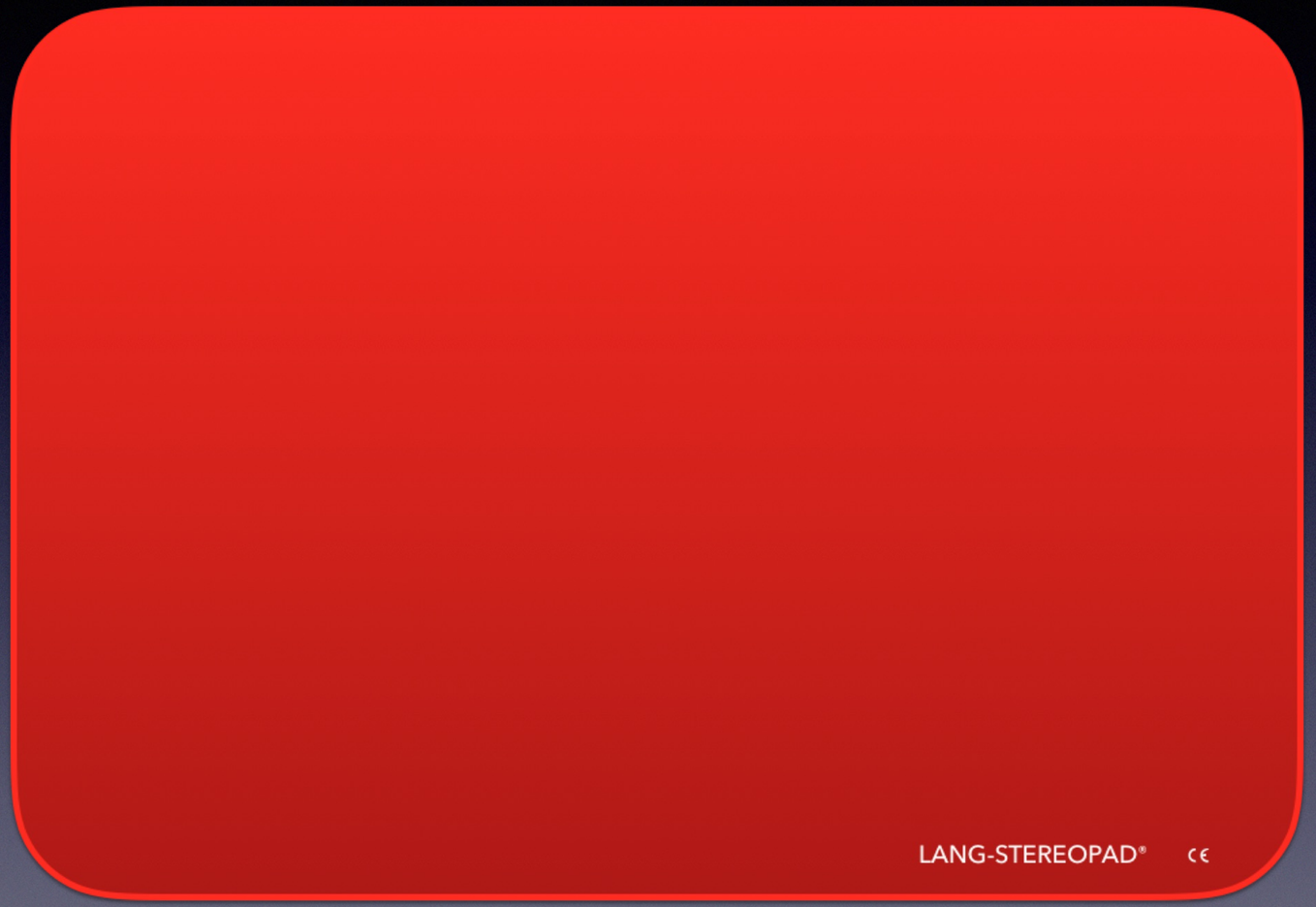




SCREENING

LANG-STEREOTEST®

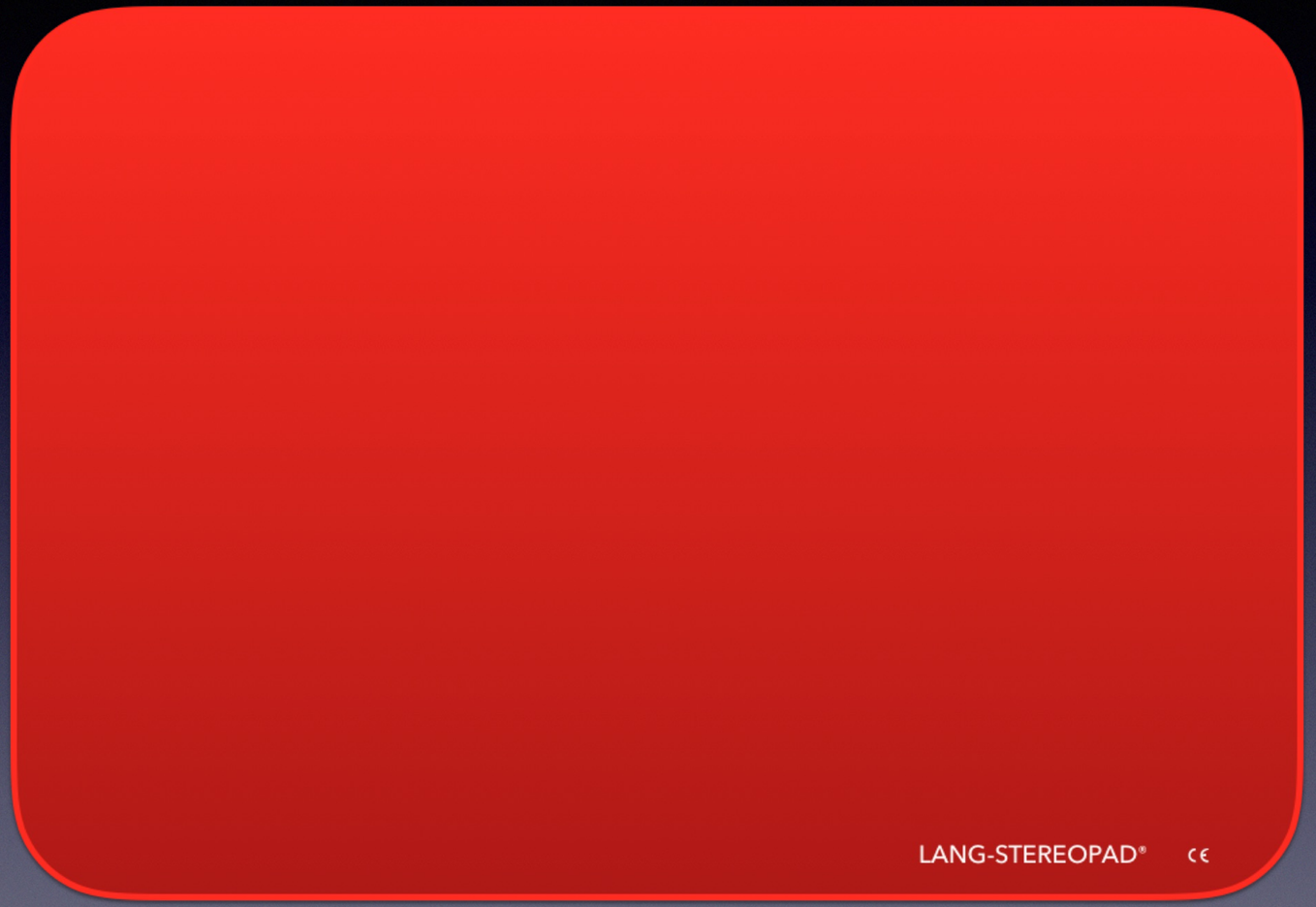
PREFERENTIAL LOOKING 法

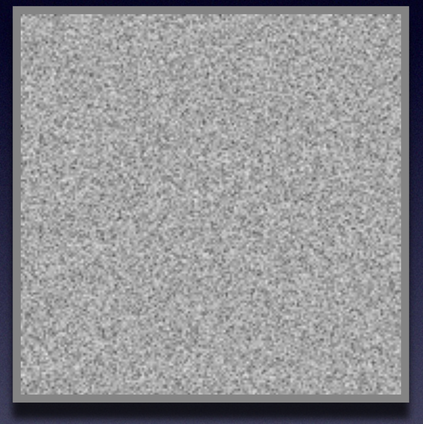






レンチキュラレンズを平行にした テストカードを用意します

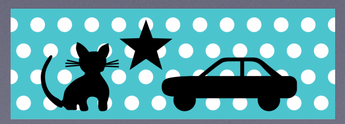






PL-METHOD

LANG-STEREOTEST®



テストカードをテストプレートに貼り付けます





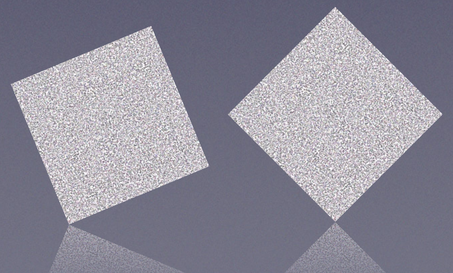
PL-METHOD

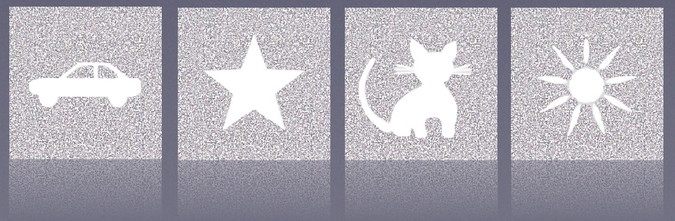
LANG-STEREOTEST®

レンチキュラレンズを垂直に位置させたテストカードを用意します



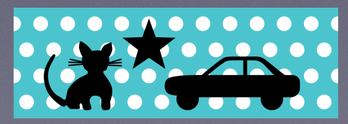




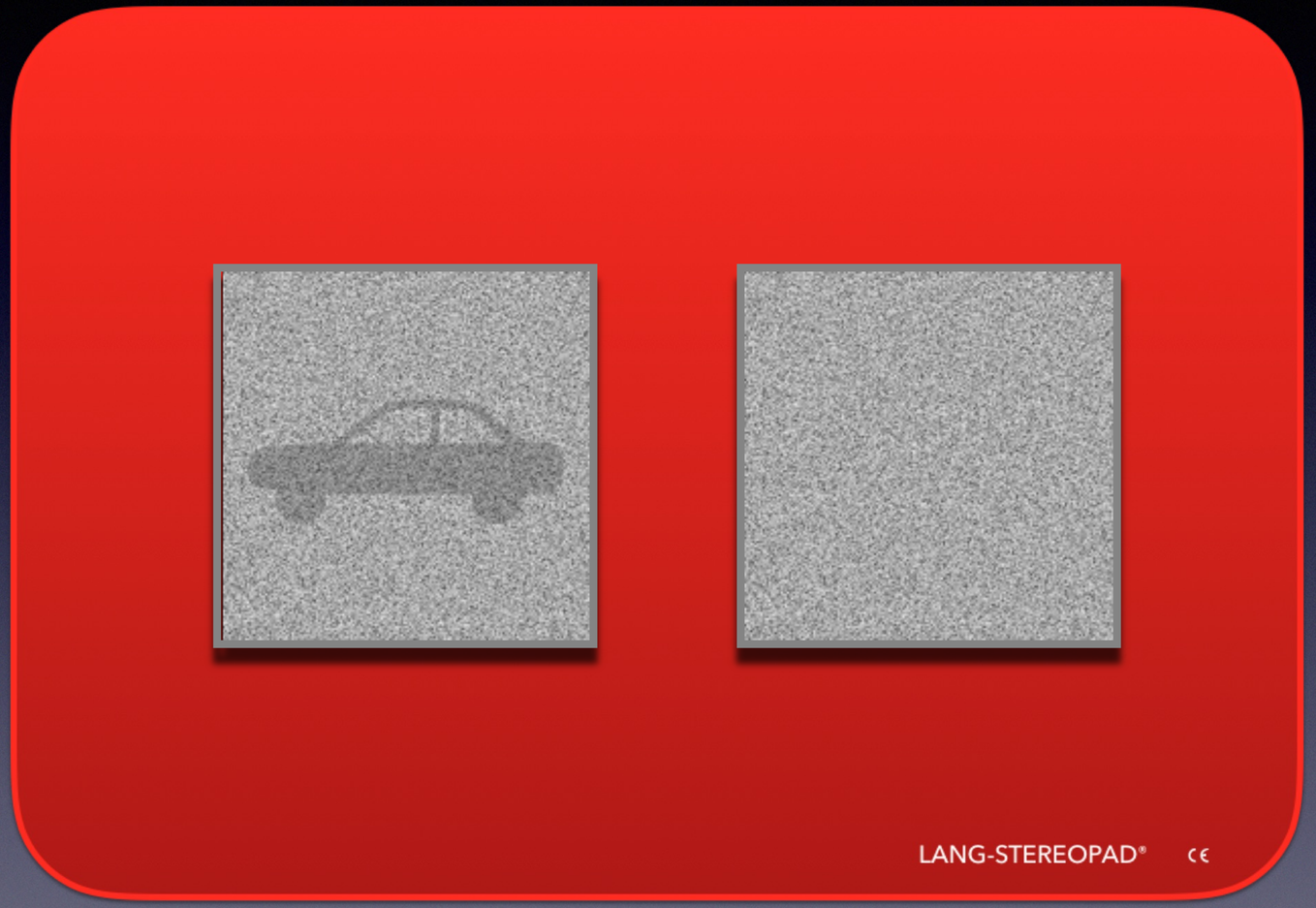


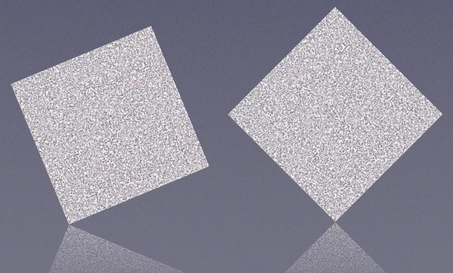
PL-METHOD

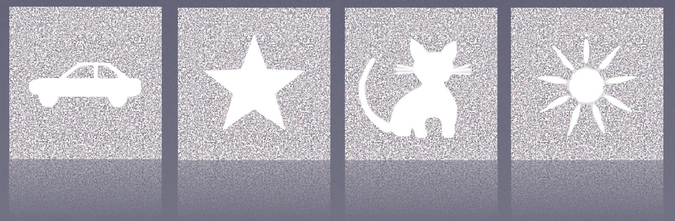
LANG-STEREOTEST®



被検者に質問します: 「そこにあるのは何?」



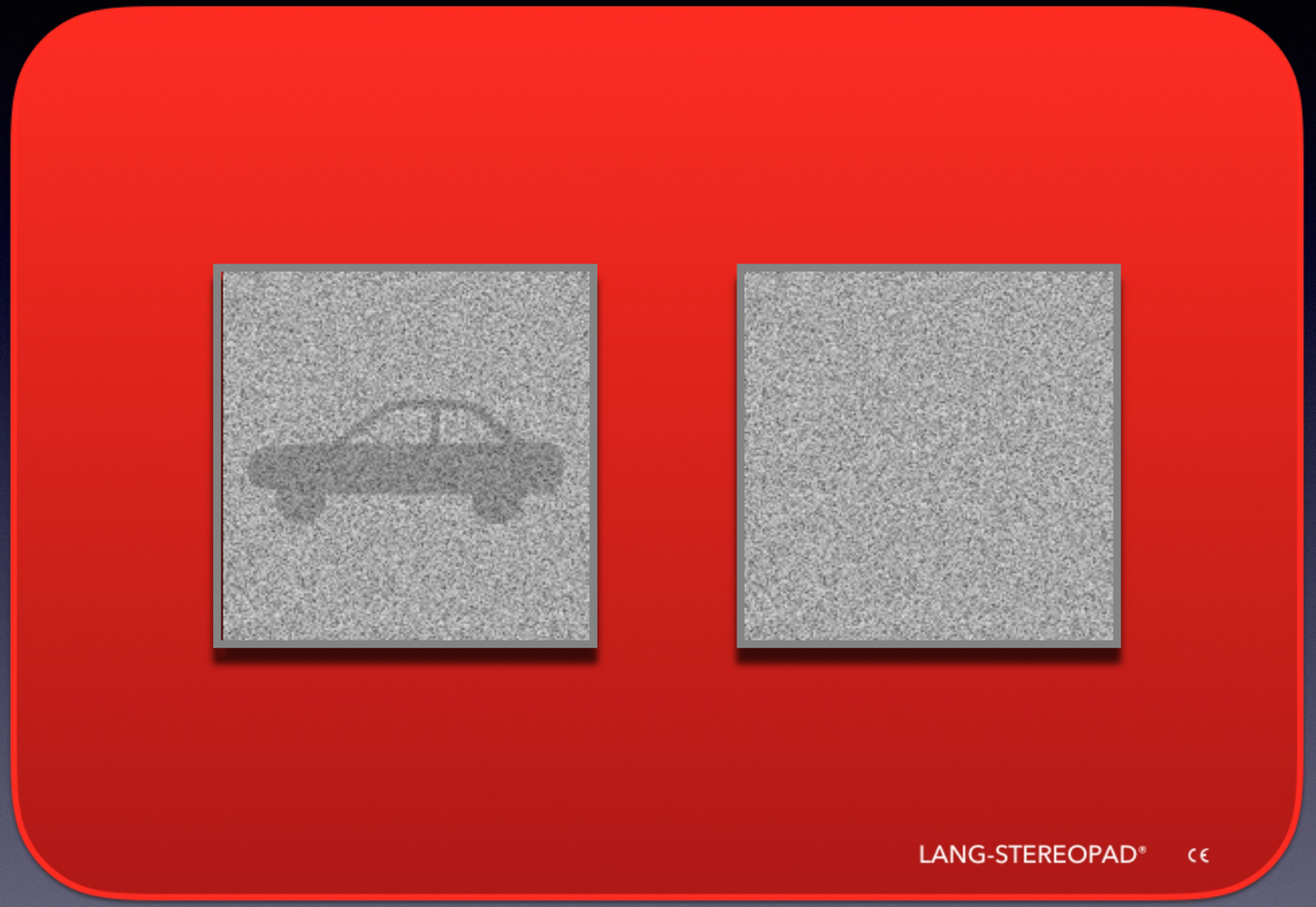


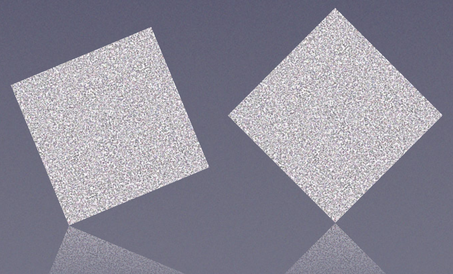


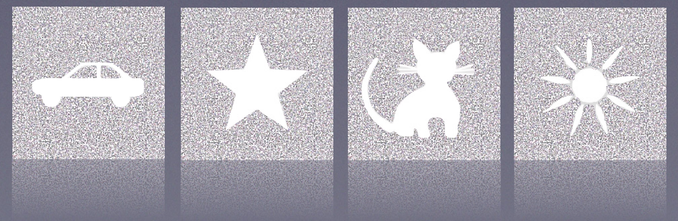
PL-METHOD

LANG-STEREOTEST®

立体視を持つ児童であれば、
「左側に浮き出た車がある」と指し示すことでしょう

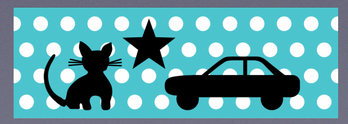




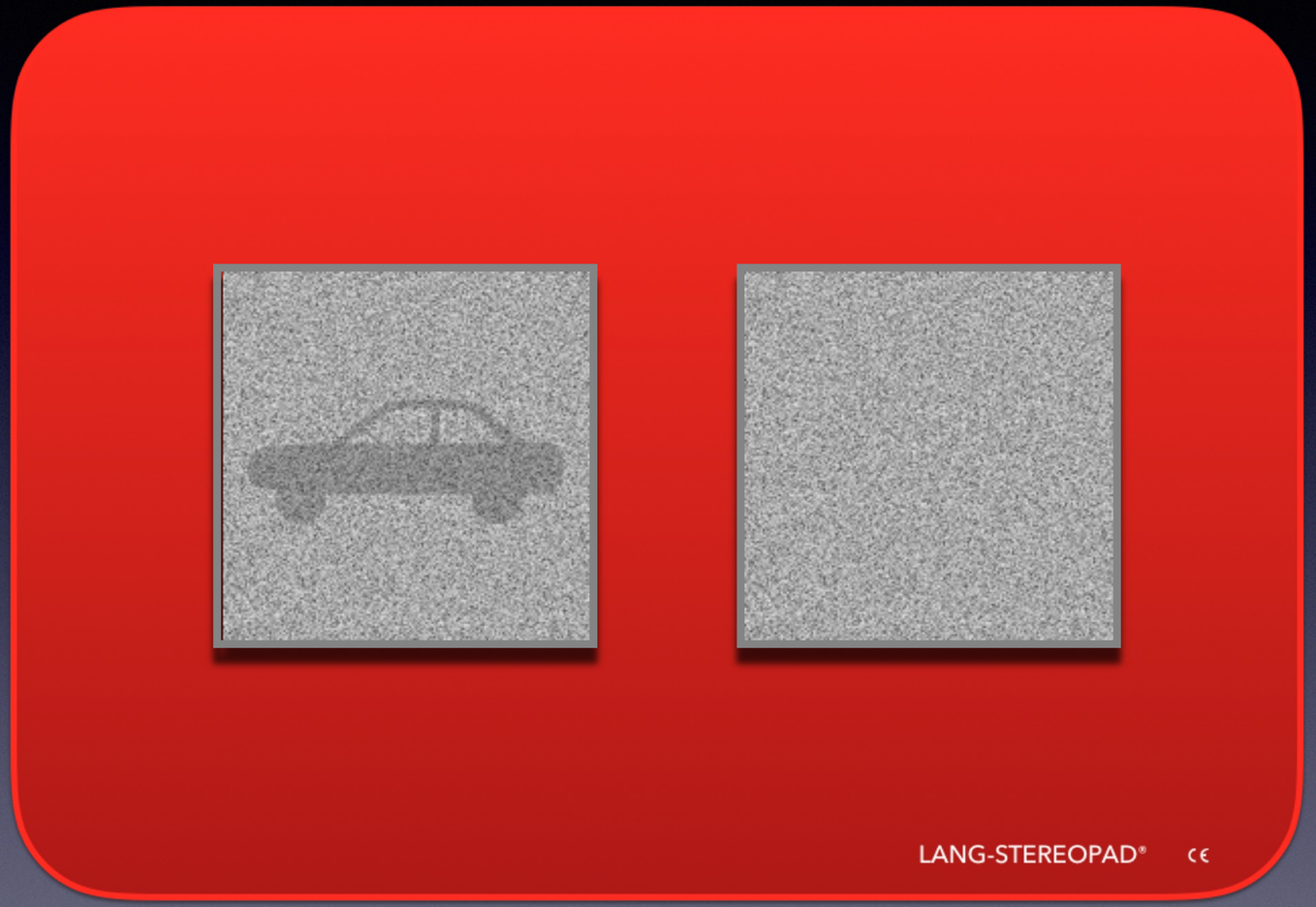


PL-METHOD

LANG-STEREOTEST®



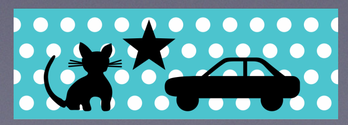
確認ステップ1: テストパネルを 90°回転させる用意をします





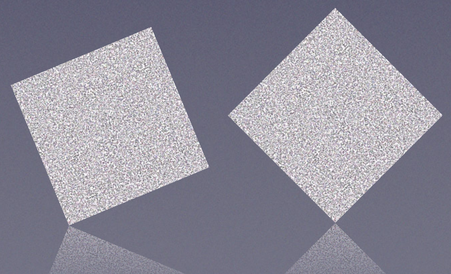
PL-METHOD

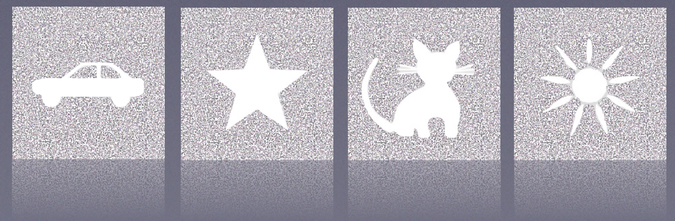
LANG-STEREOTEST®

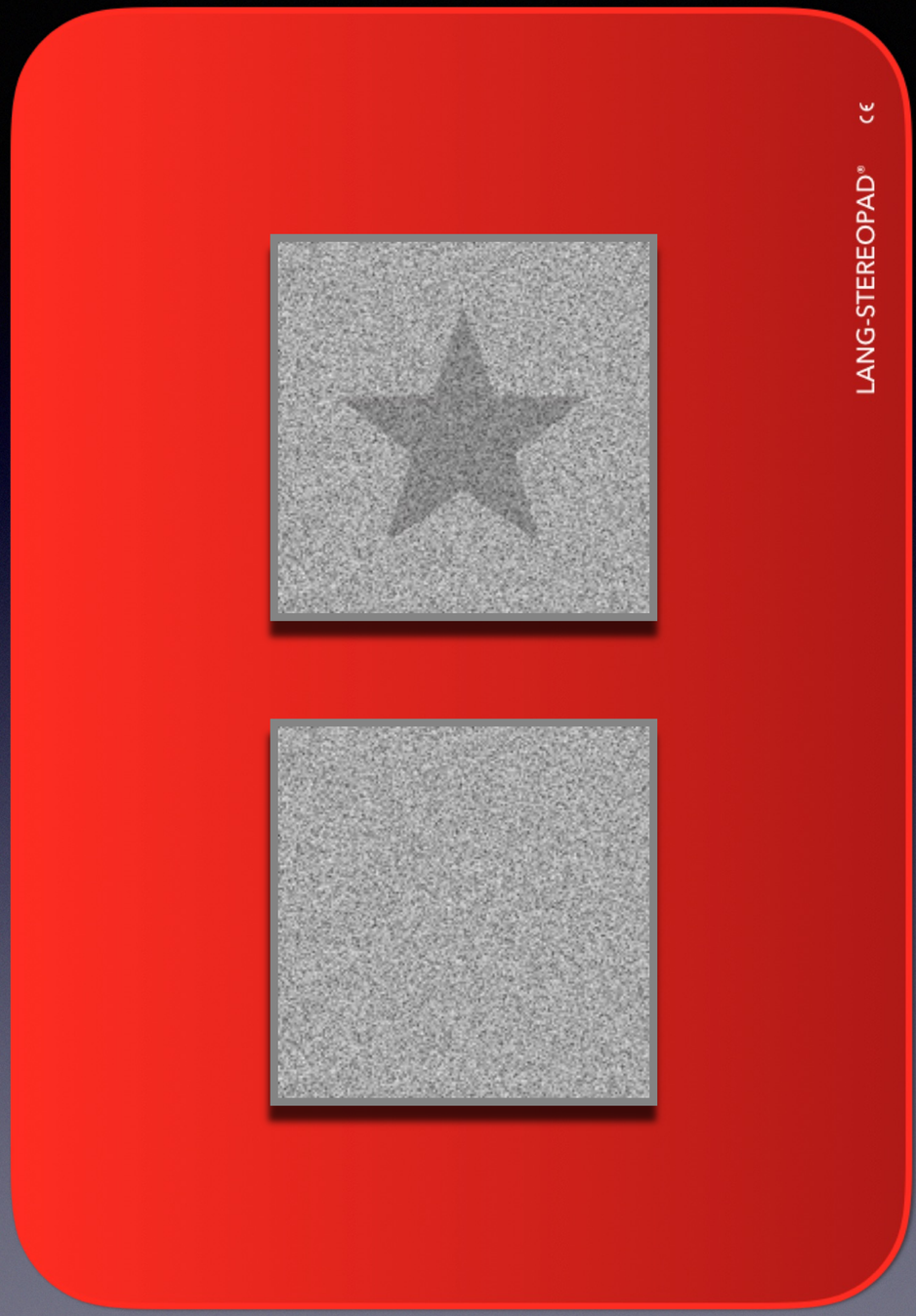


PL法

ポートレイトポジション





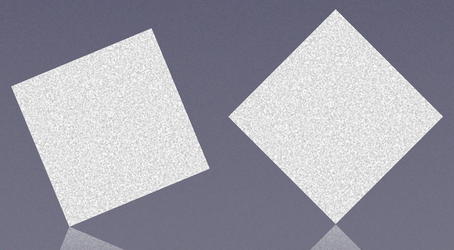


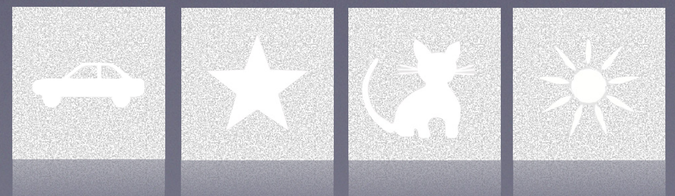
LANG-STEREOTEST®

PL法

テストパネルをポートレイトポジションにする





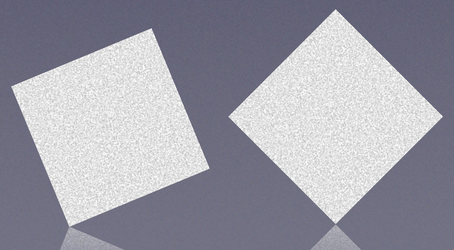


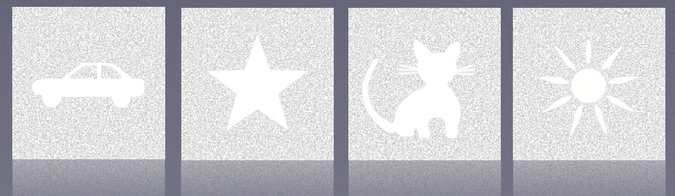
LANG-STEREOTEST®

PL法

被検者に質問します:
「今度は何が見える?」





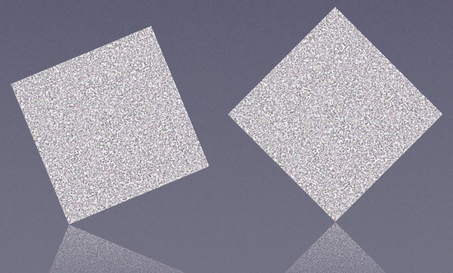


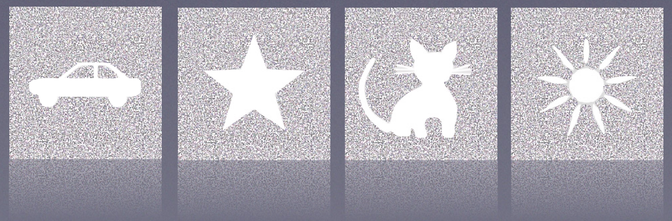
LANG-STEREOTEST®

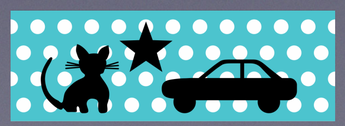
PL法

立体視がある児童であれば「車が消えて、ここに星が見える」と指で指し示すでしょう

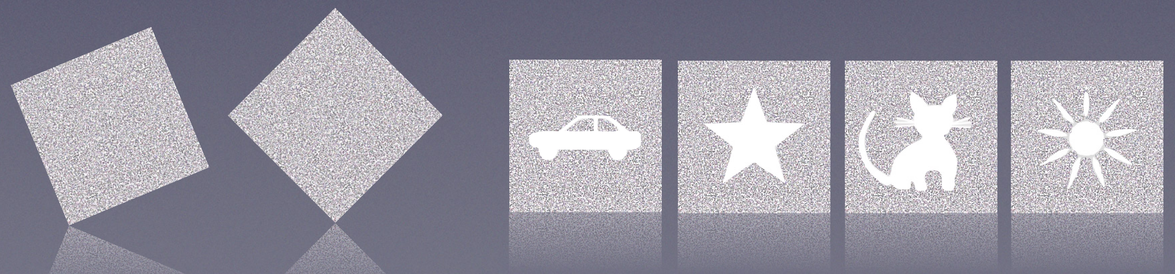




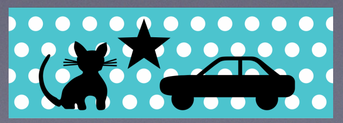




立体視力の測定

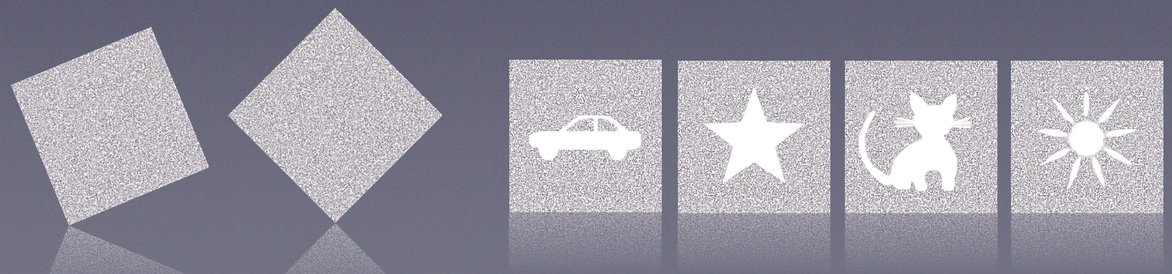


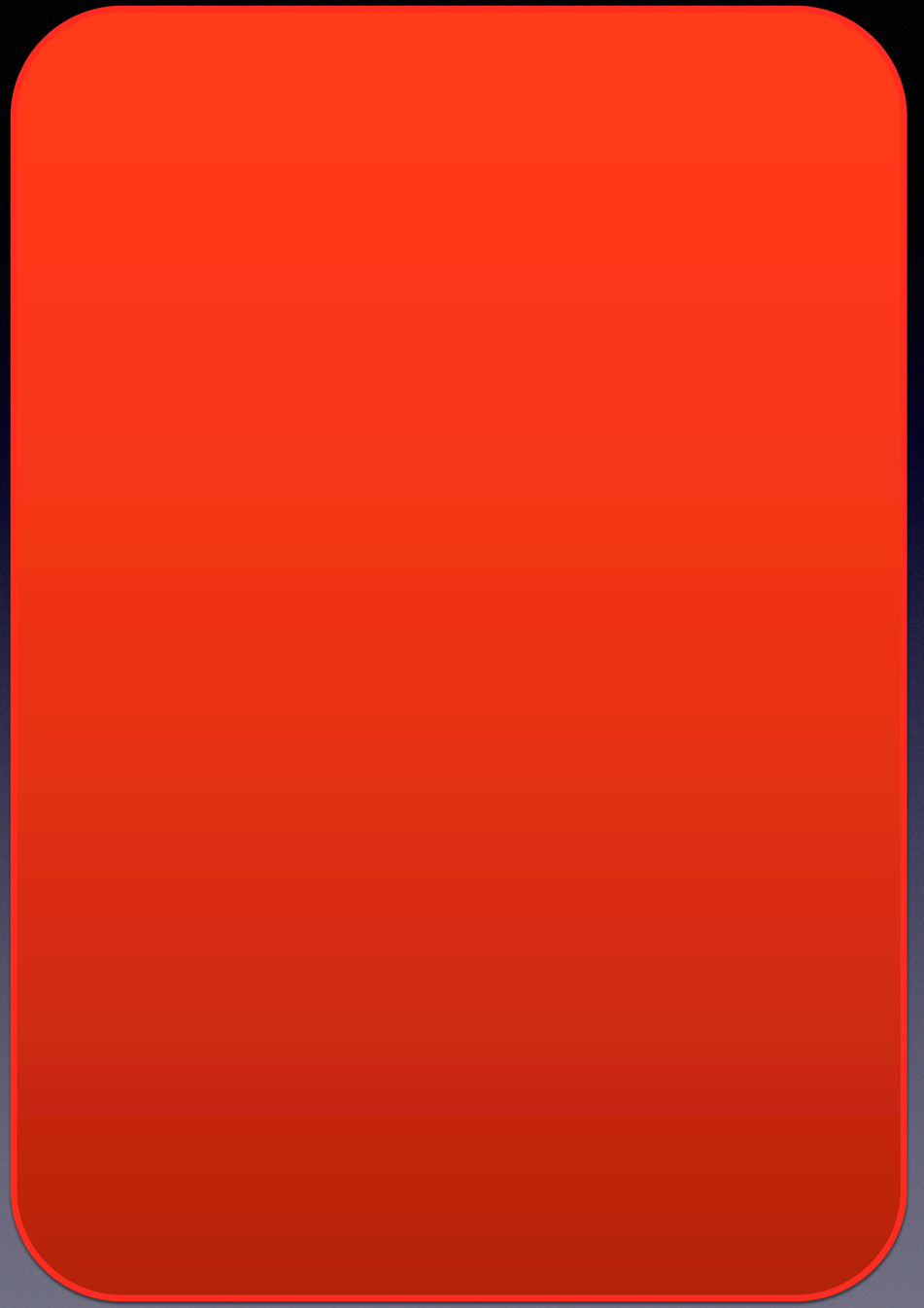
LANG-STEREOTEST®



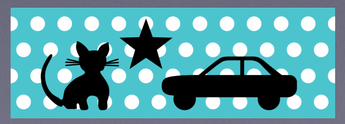
立体視力の測定

テストパネルをポートレイトポジションで使用します



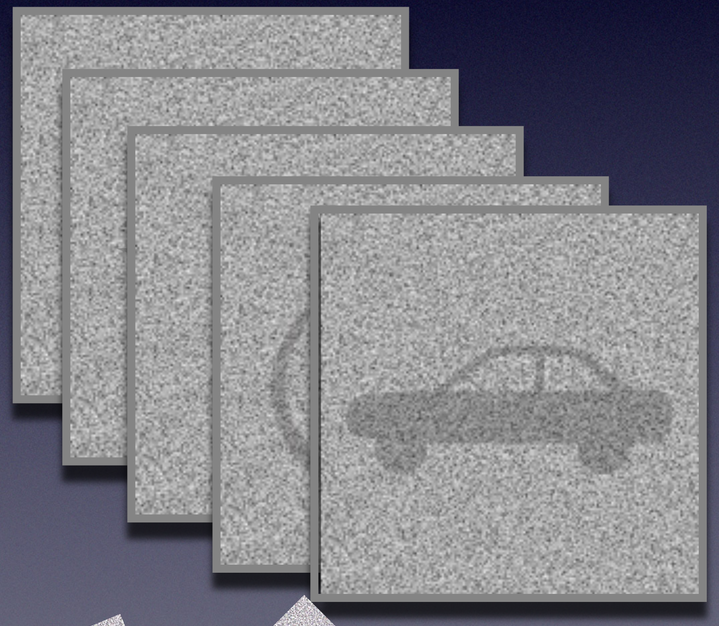


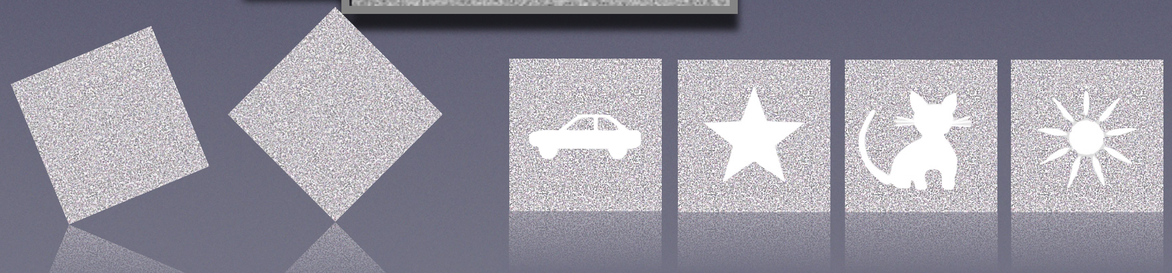
LANG-STEREOTEST®

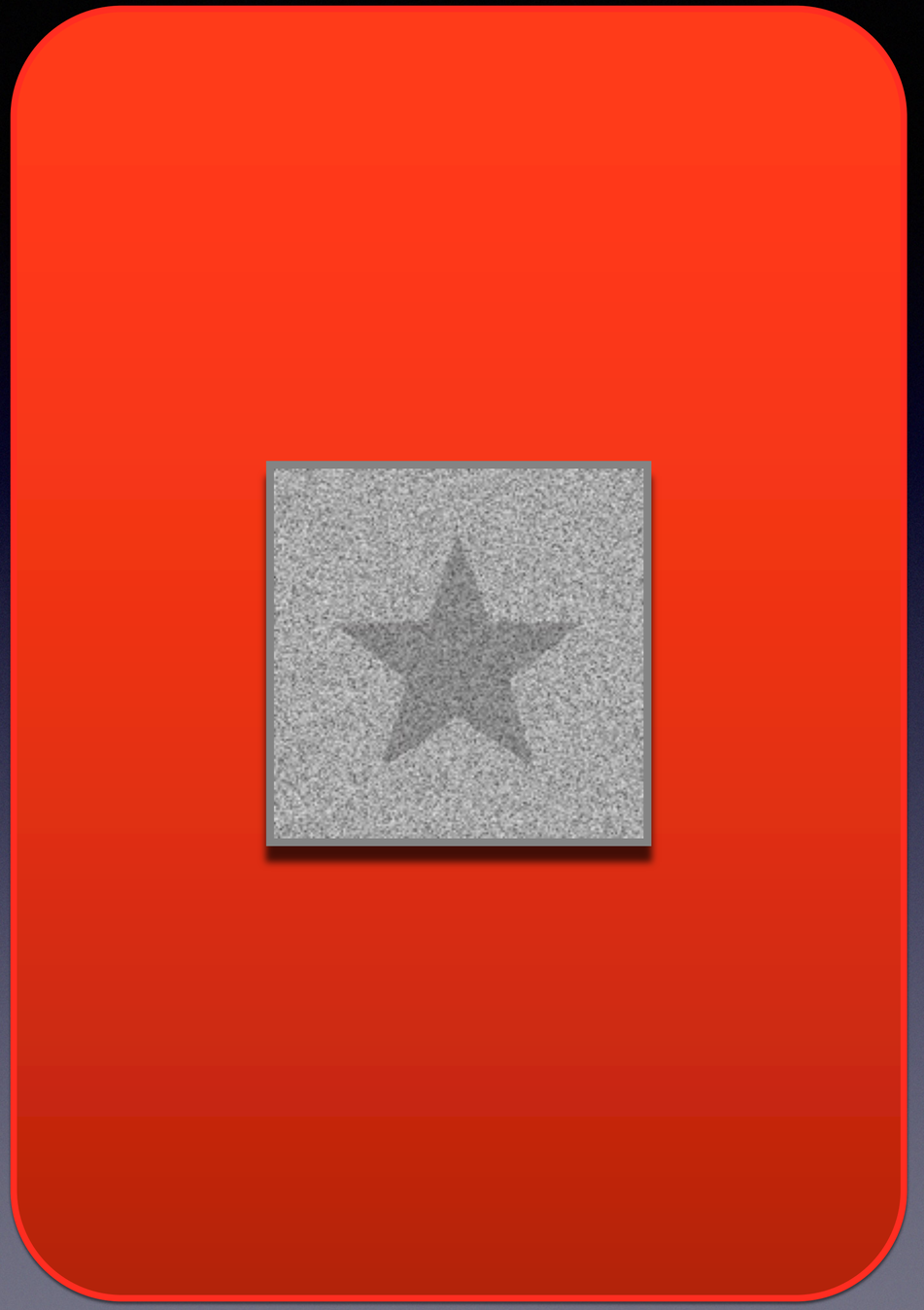


立体視力の測定

最も大きな視差を持つ
テストカード星1000″を
配置します



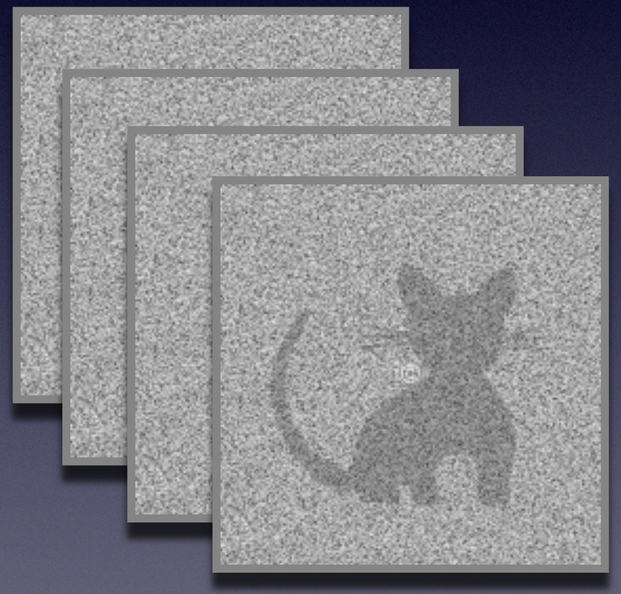




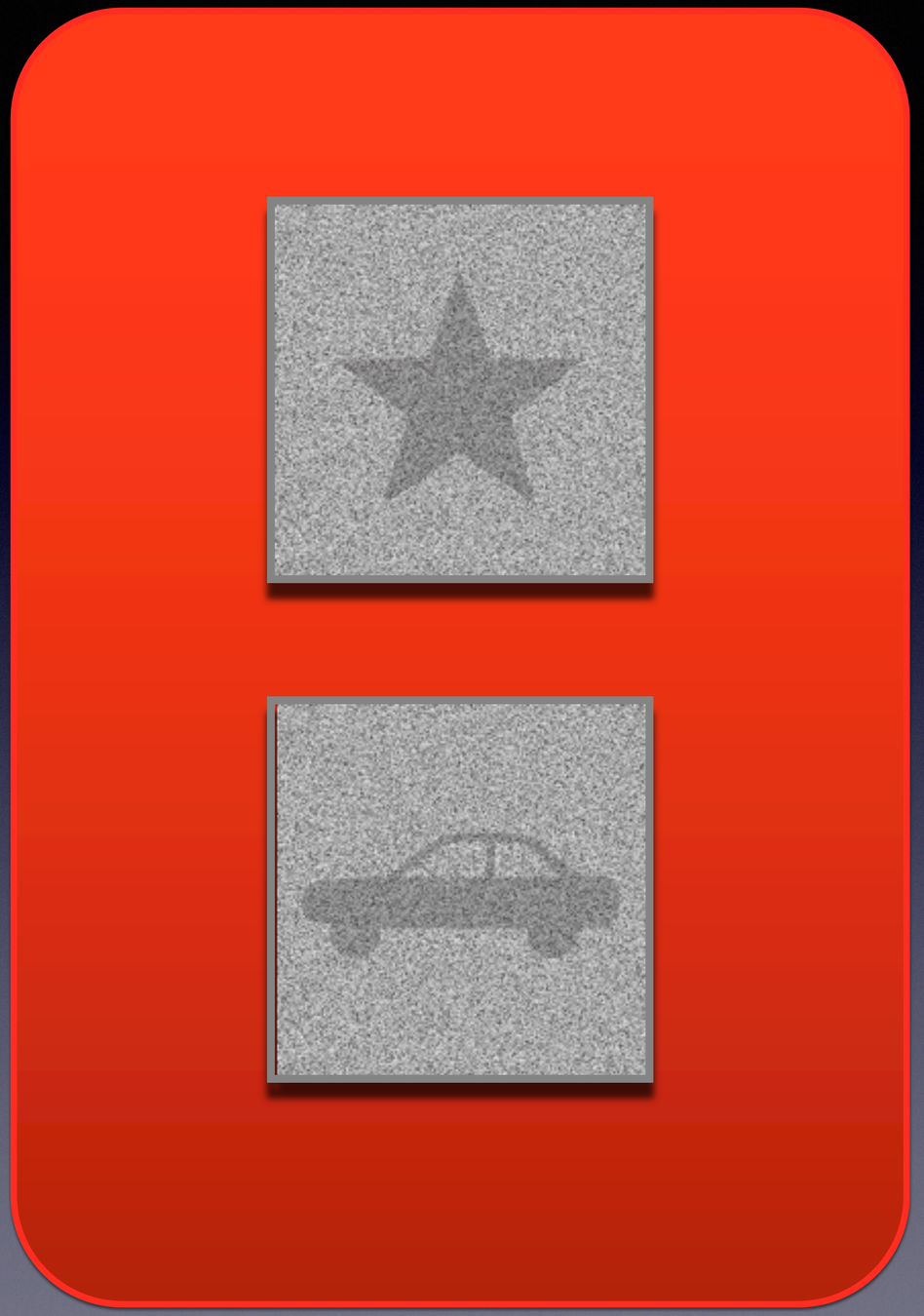
LANG-STEREOTEST®

立体視力の測定

テストカード星1000″の
下に車600″を加えます



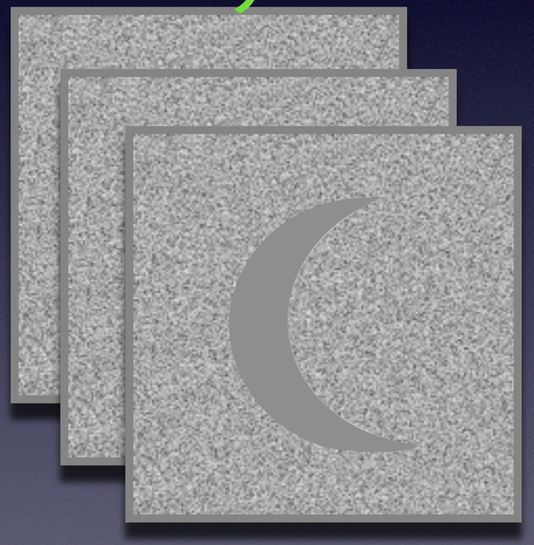


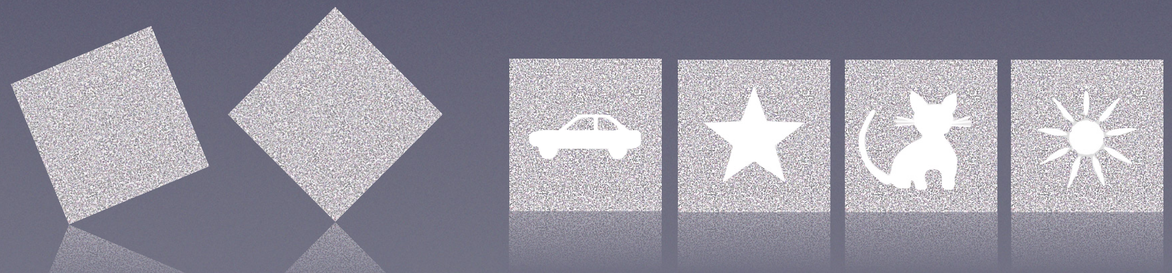


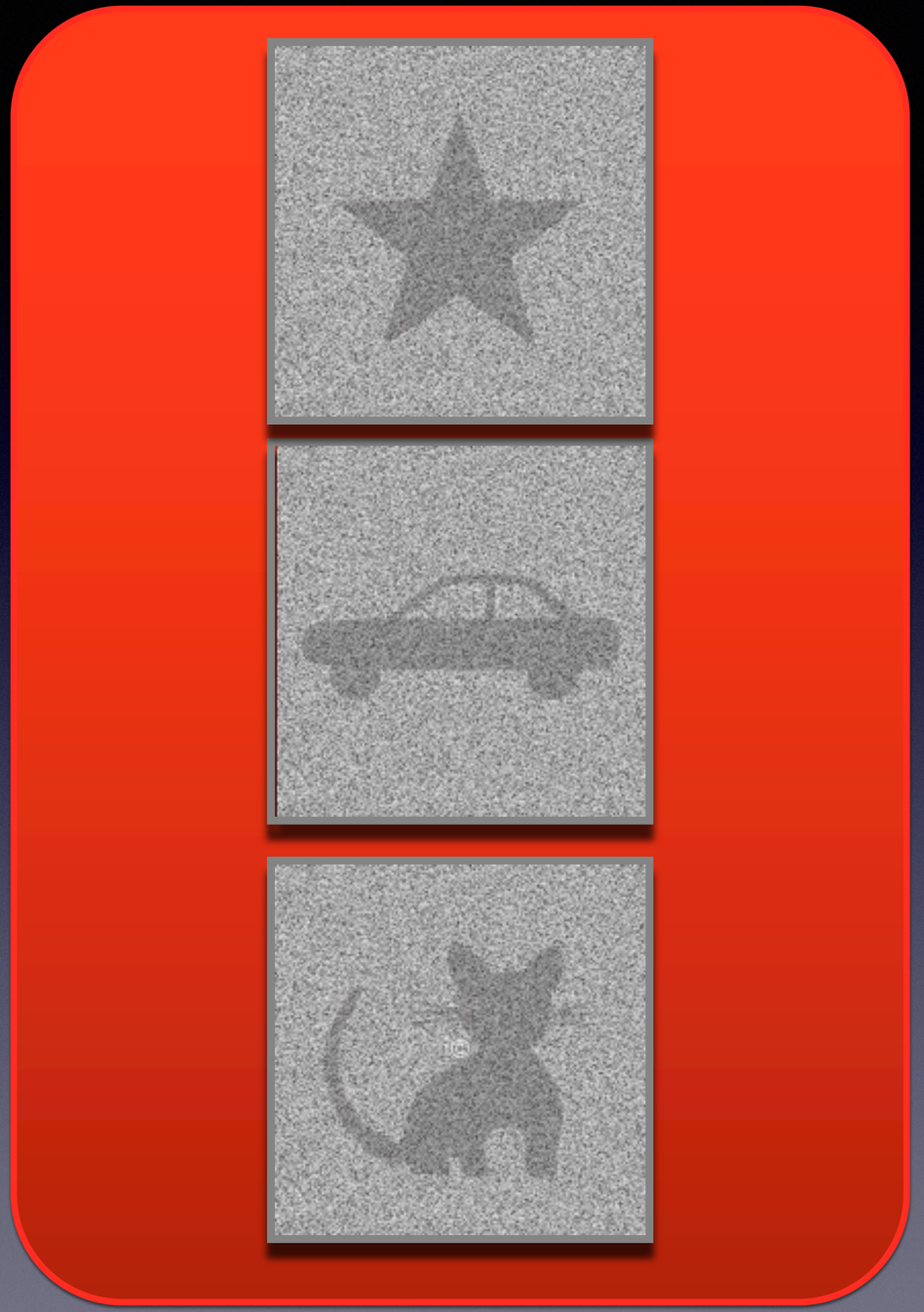
LANG-STEREOTEST®

立体視力の測定

車600″のカードの下に
更にもう1枚猫400″の
テストカードを加えます



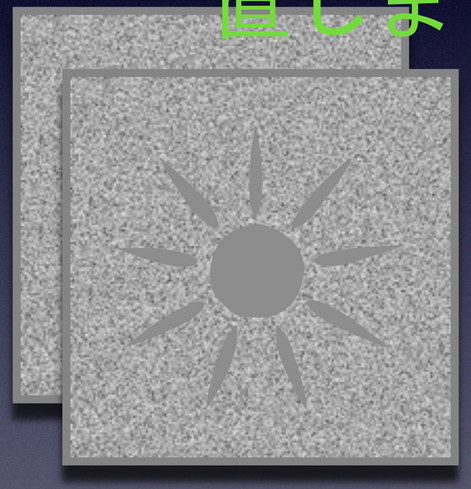


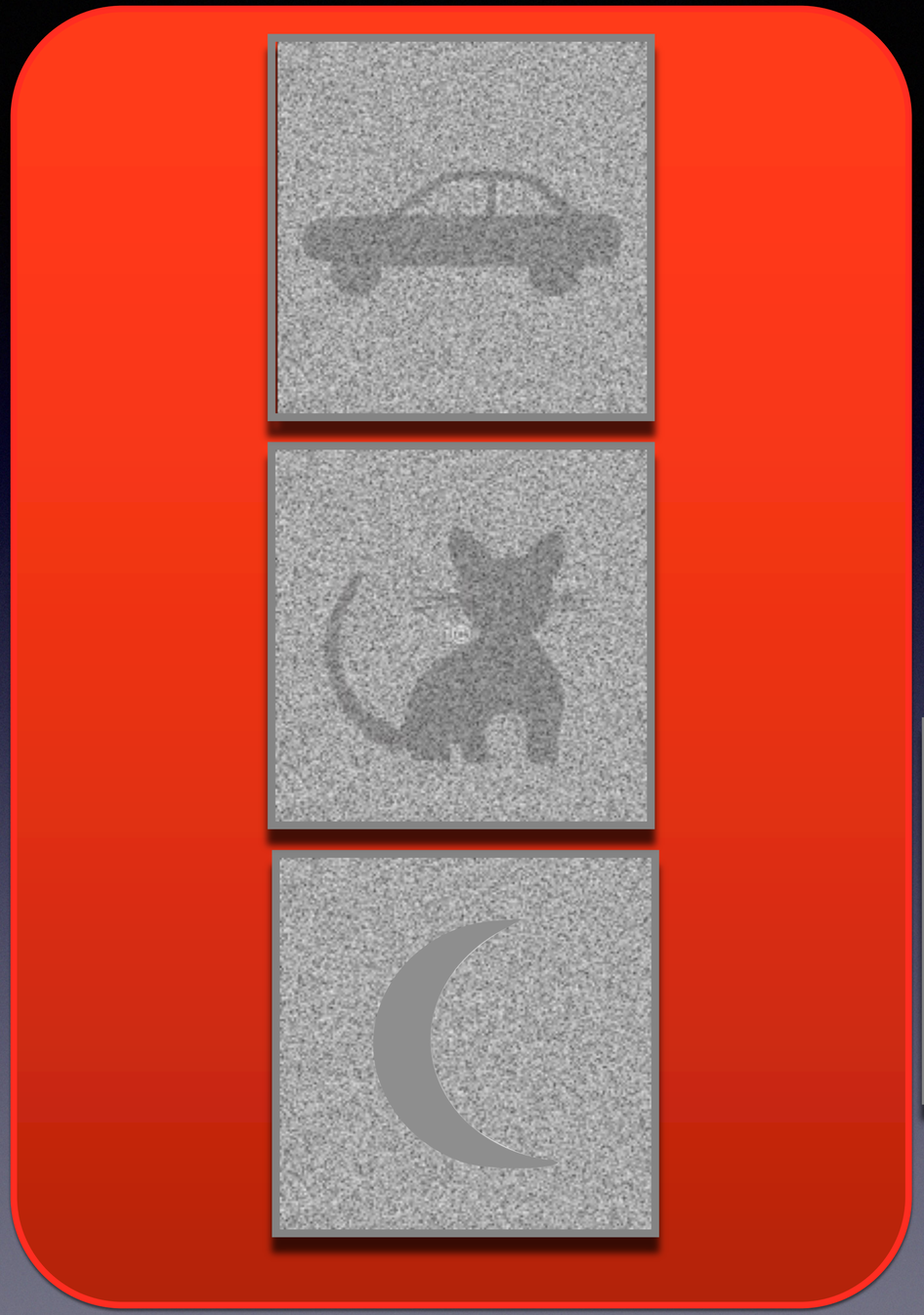


LANG-STEREOTEST®

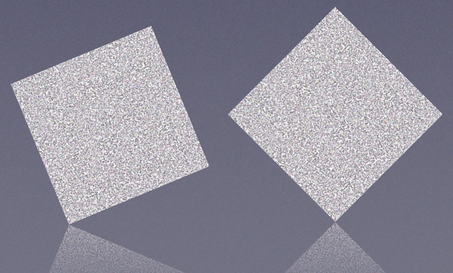
立体視力の測定

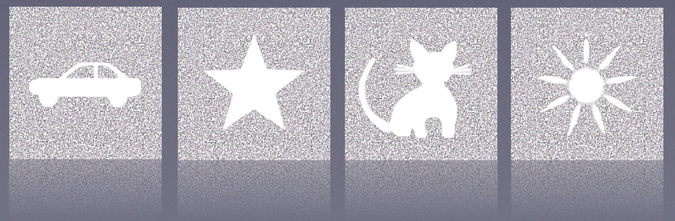
順次、視差の一番大きいテストカードを取り除き、一番下に視差の低いテストカードを配置します











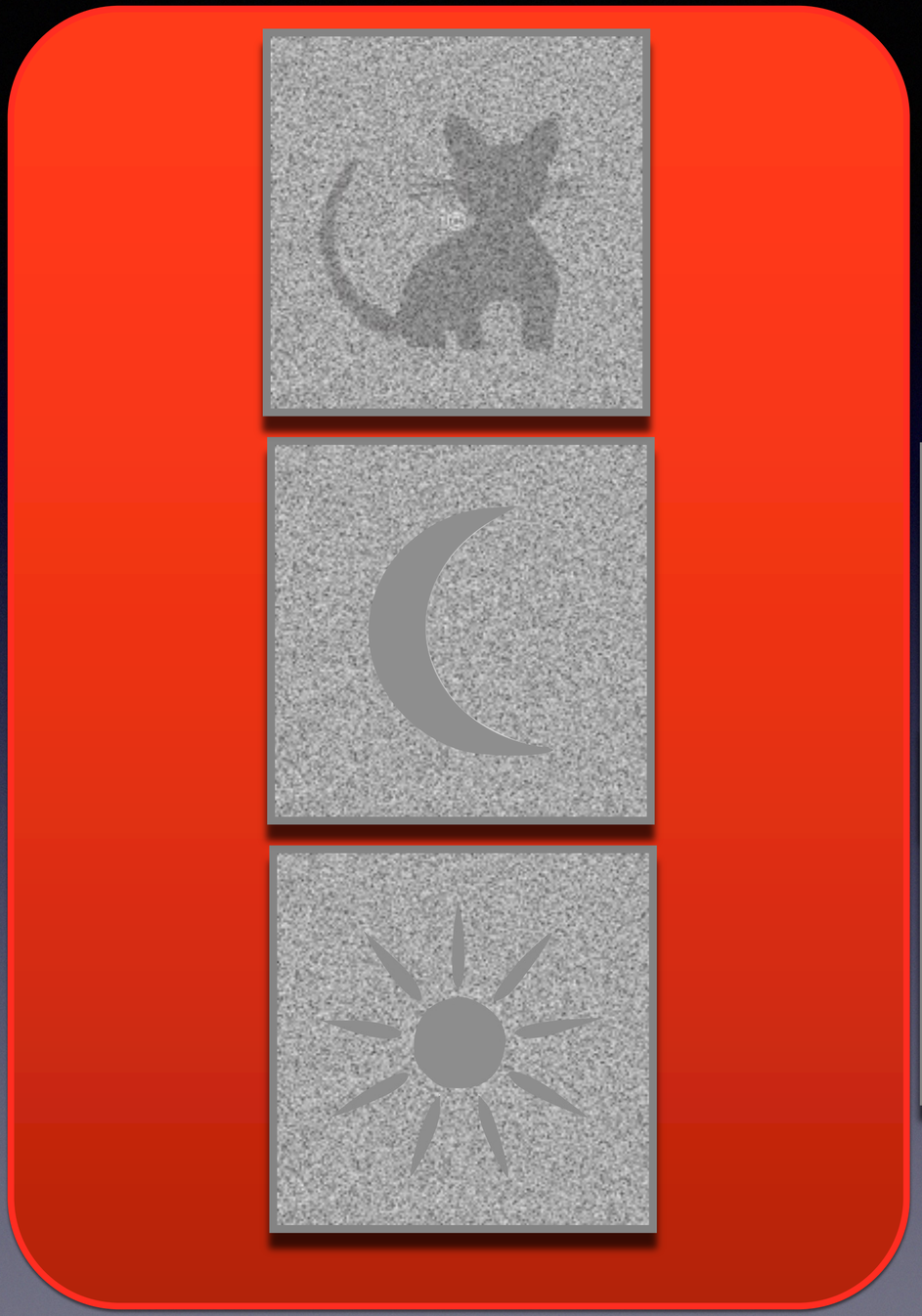
LANG-STEREOTEST®

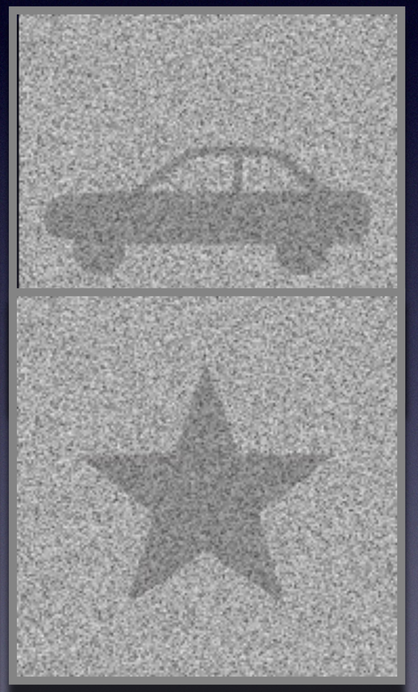


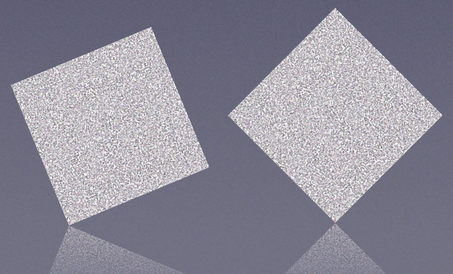
立体視力の測定

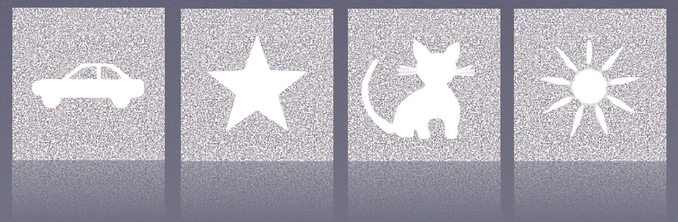
再び視差の大きいテストカードを取り除き、一番下に視差の低いテストカードを配置します



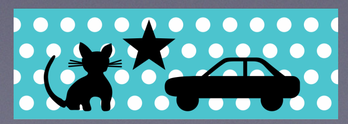






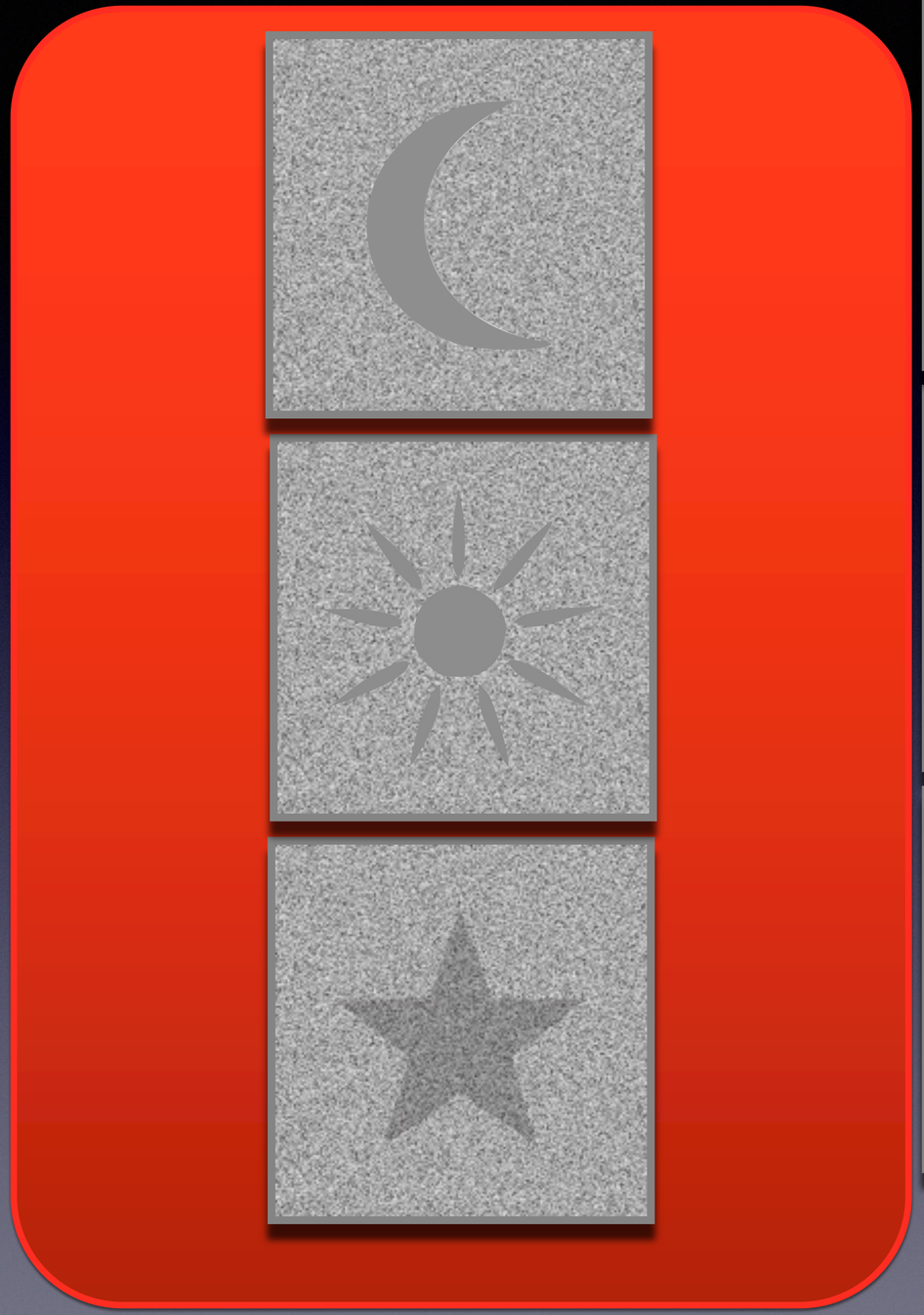


LANG-STEREOTEST®



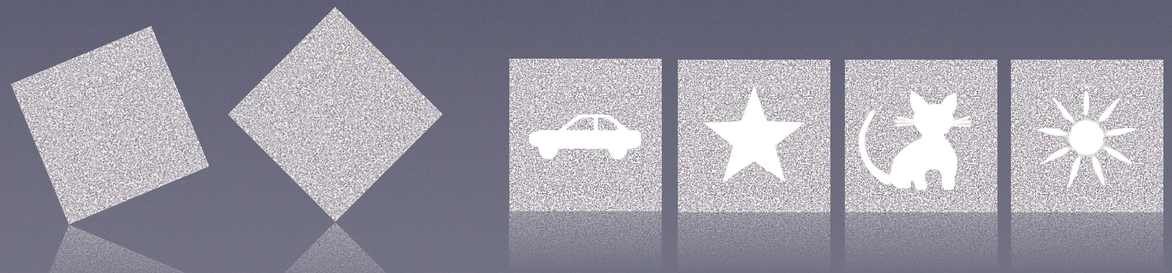
立体視力の測定

視認できる一番小さな
テストカードの視差が
立体視力値です

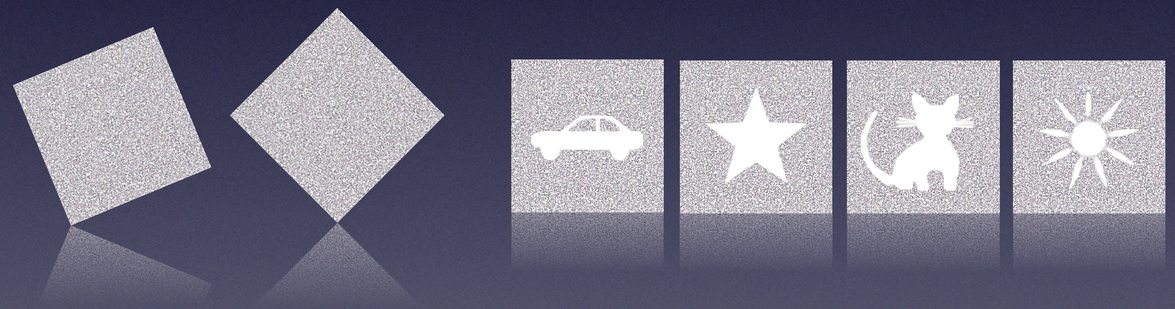




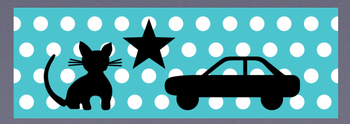
LANG-STEREOTEST®



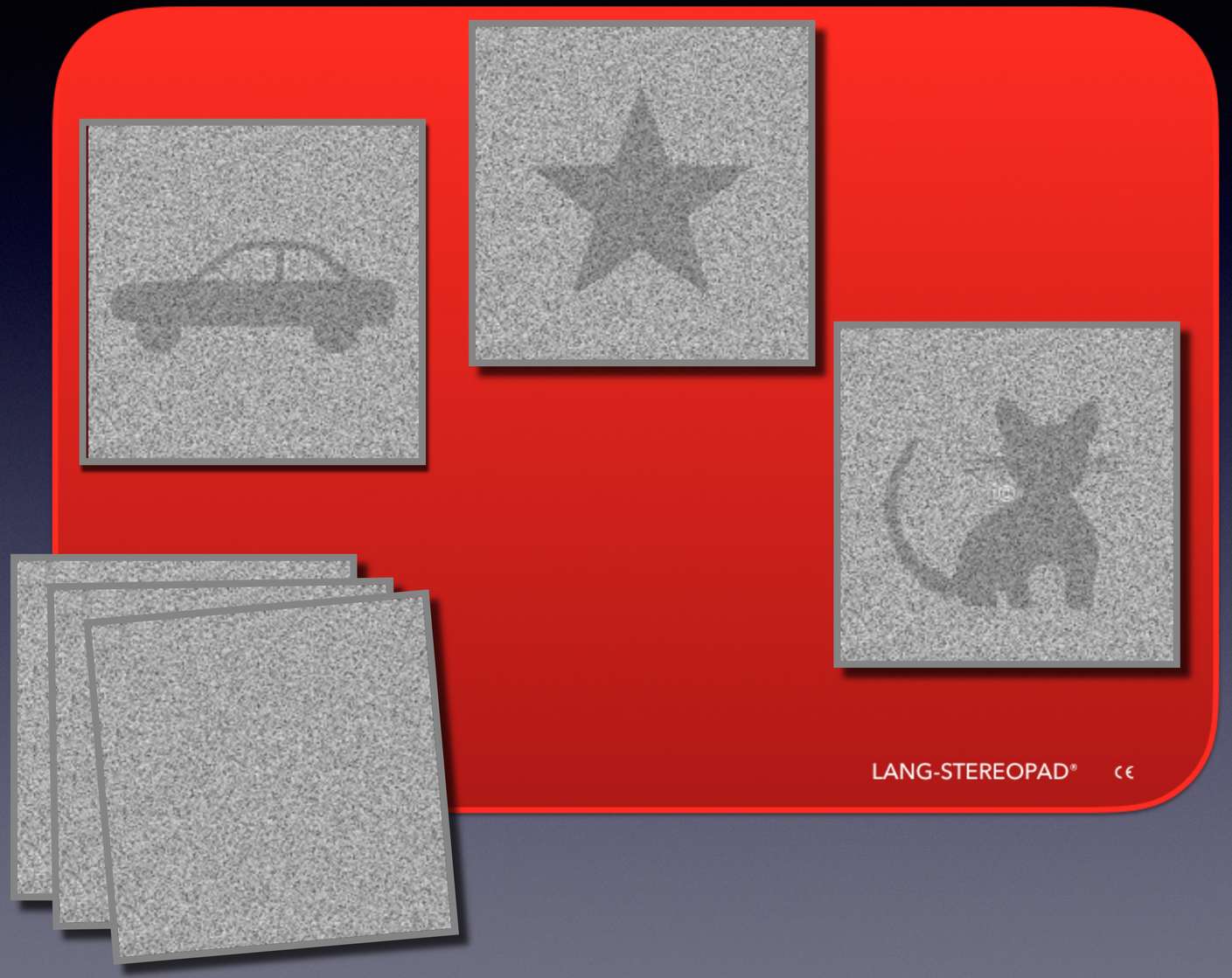
LANG-STEREOPAD®



LANG-STEREOTEST®



STUDY RESULTS



LANG-STEREOTEST®

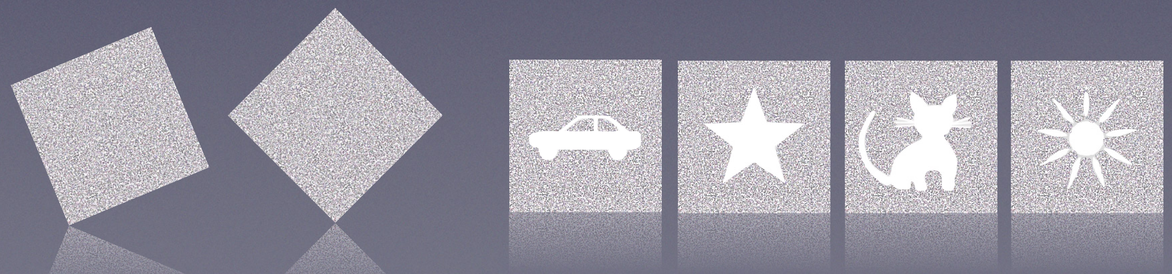
Studies

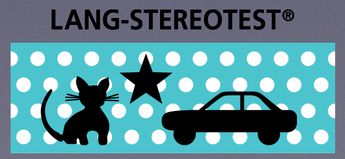
Study 1: Normally sighted children compared to Lang I and TNO. Piantanida, 2017

Study 2: Normally sighted adults: comparison to TNO, Frisby, Lang II. Rowe et al. 2019

Study 3: Children suspected with microstrabismus after Lang I. Piantanida et al. 2019

Study 4: Development of sterepsis between 4 and 7 months. Röthlisberger, Frick, 2020





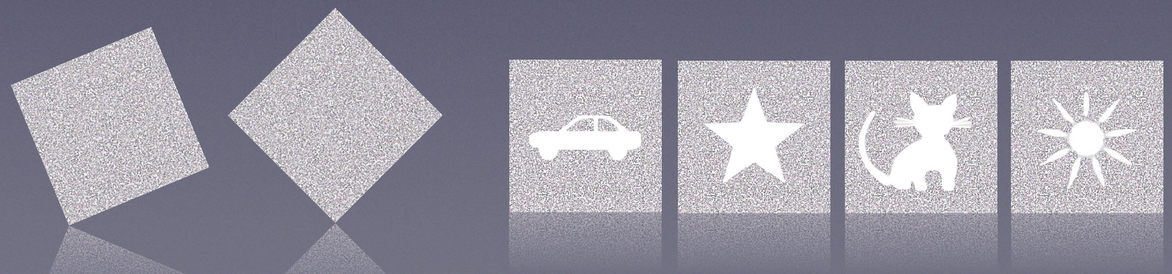
Study 1:
Normally sighted children

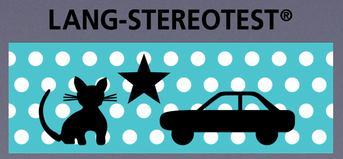
SAMPLE:
240 orthotropic* children aged <1 to10 years.

METHOD:
Direct screening or with preferential looking method, with LANG-STEREOPAD prototype.

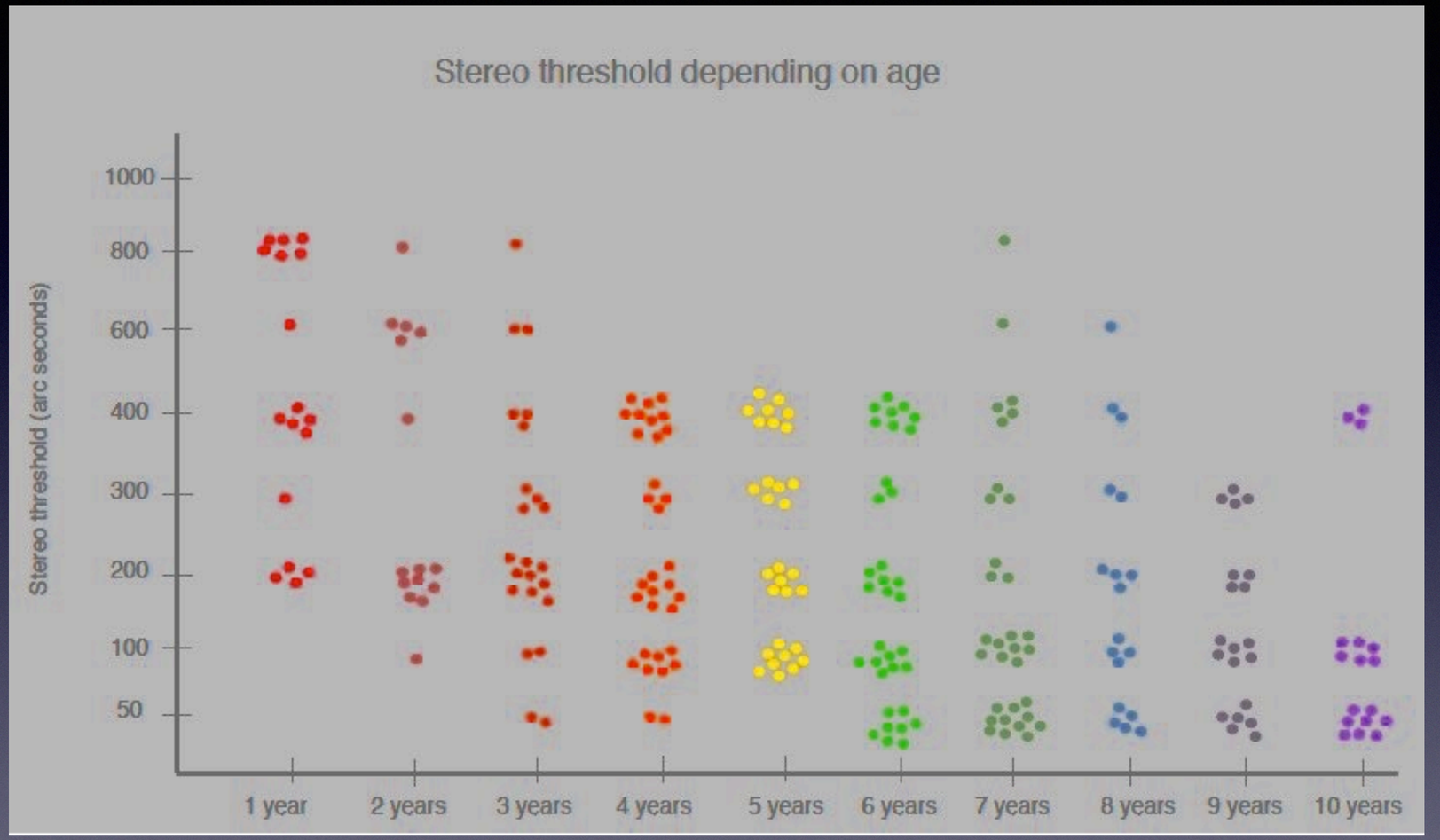
Sensitivity for Stereopsis: 100% in all age groups.
Specificity for Stereopsis:
- for younger than one-year-olds and five to ten-year-olds: 100%
- for two- to four-year-olds: 93.8%-97%

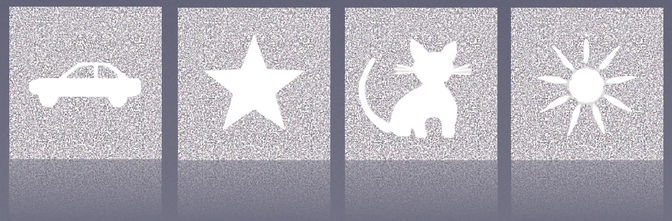
* 8-DIOPTERS BASE-IN TEST OF PAGLIAGA A.Piantanida, Cernobbio-Como, Italy, 2017





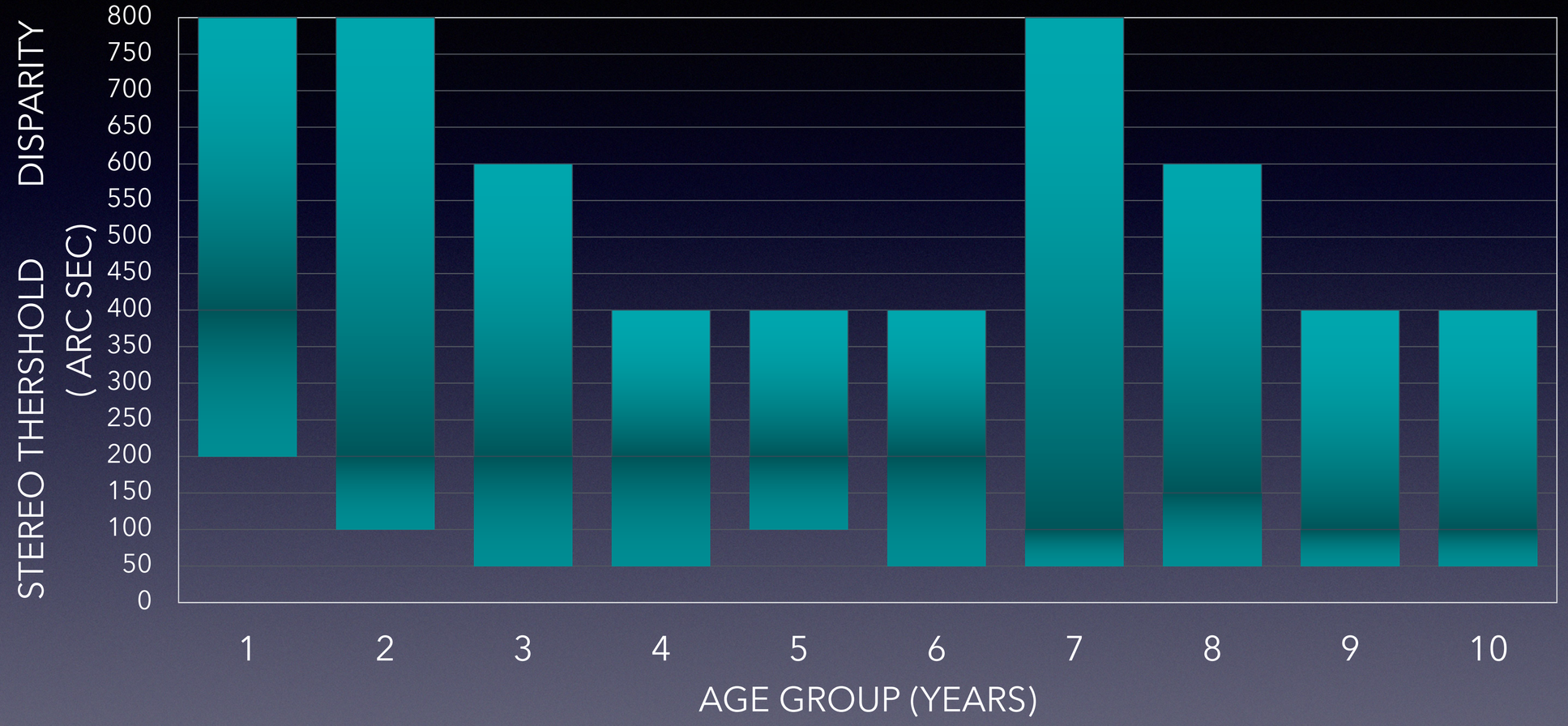
Stereo threshold (arc sec) in n=240 orthotropic children

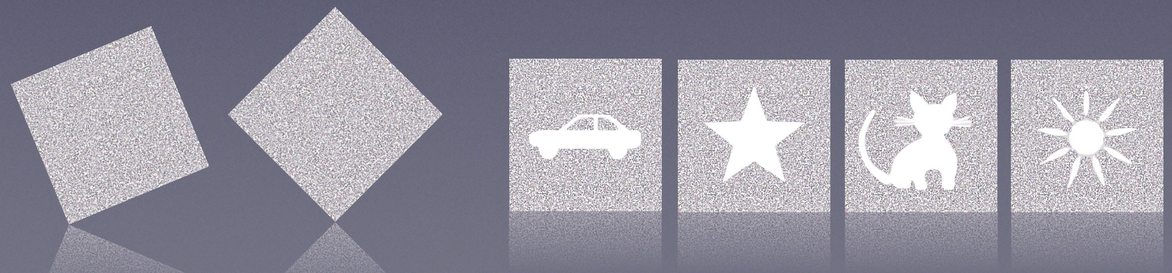




LANG-STEREOTEST®

RANGE AND MEDIAN OF STEREO THRESHOLD IN 240 ORTHOTROPIC CHILDREN OF AGE GROUPS 1-10 YEARS





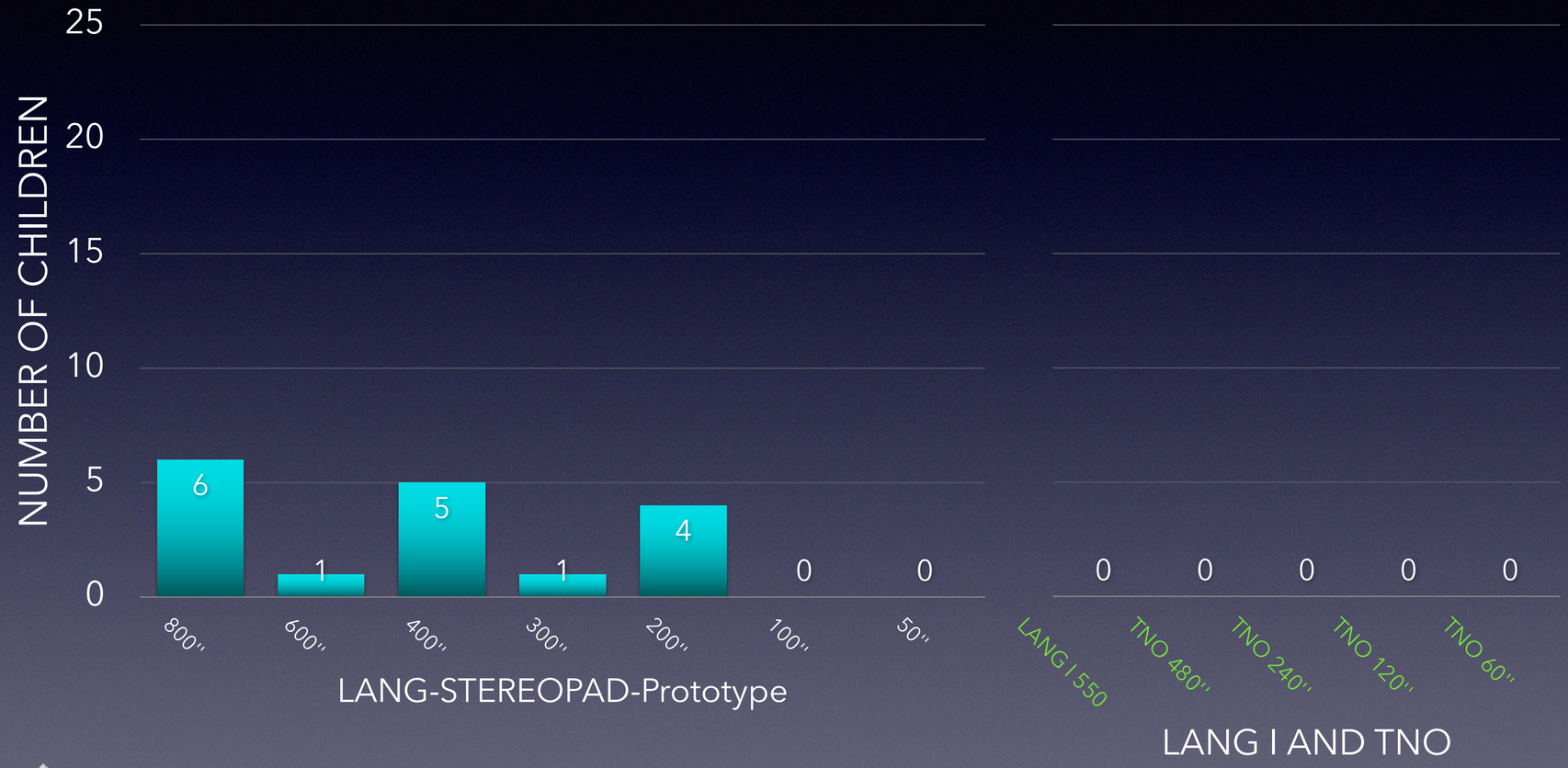
A.Piantanida, Cernobbio-Como, Italy, 2017

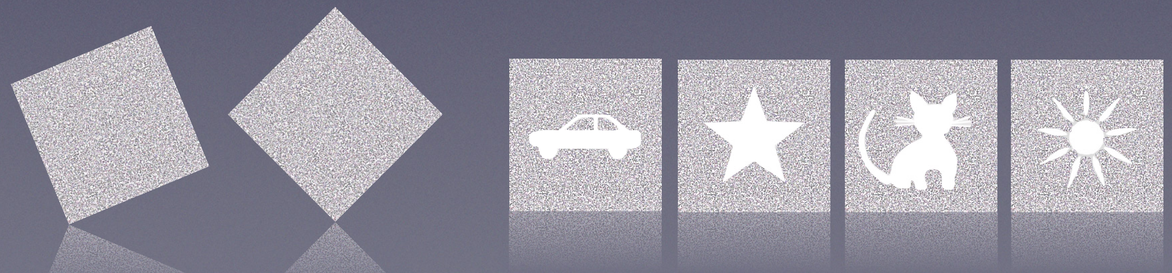
LANG-STEREOTEST®



STEREO THRESHOLDS ON LANG-STEREOPAD (PROTOTYPE), LANG-STEREOTEST I AND TNO

AGE GROUP: UP TO 1 YEAR N=17



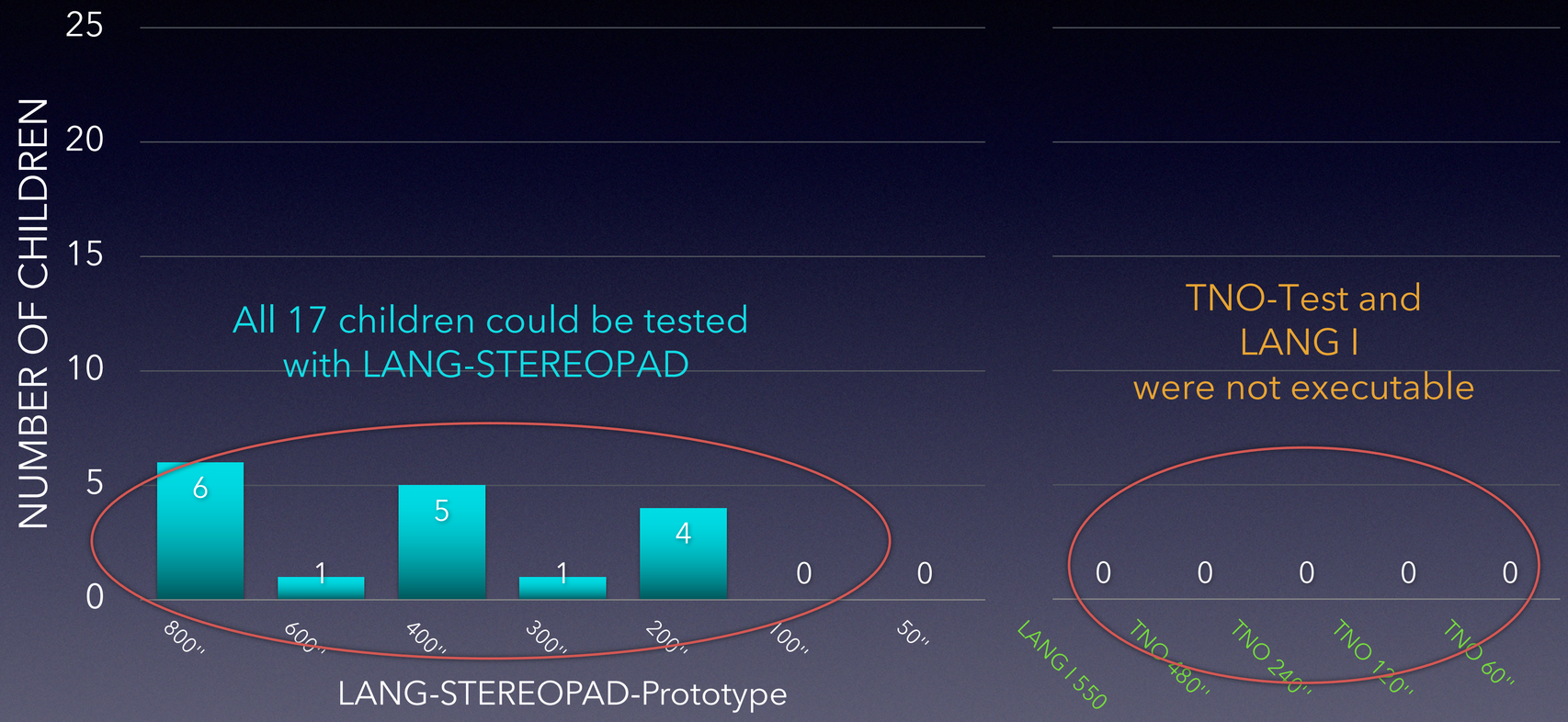


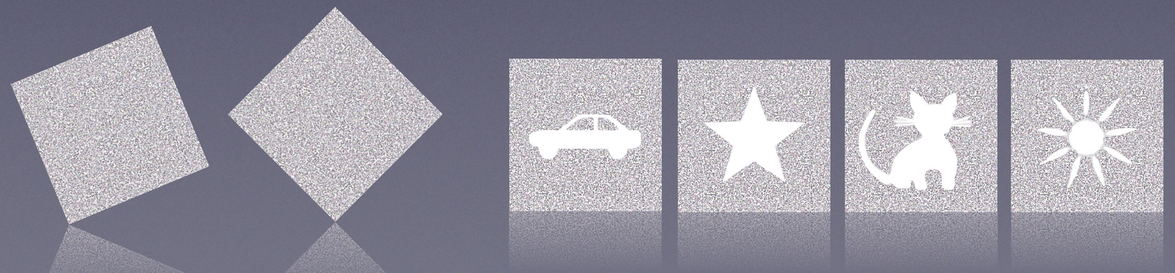
A.Piantanida, Cernobbio-Como, Italy, 2017

LANG-STEREOTEST®

STEREO THRESHOLDS ON LANG-STEREOPAD (PROTOTYPE), LANG-STEREOTEST I AND TNO

AGE GROUP: UP TO 1 YEAR N=17



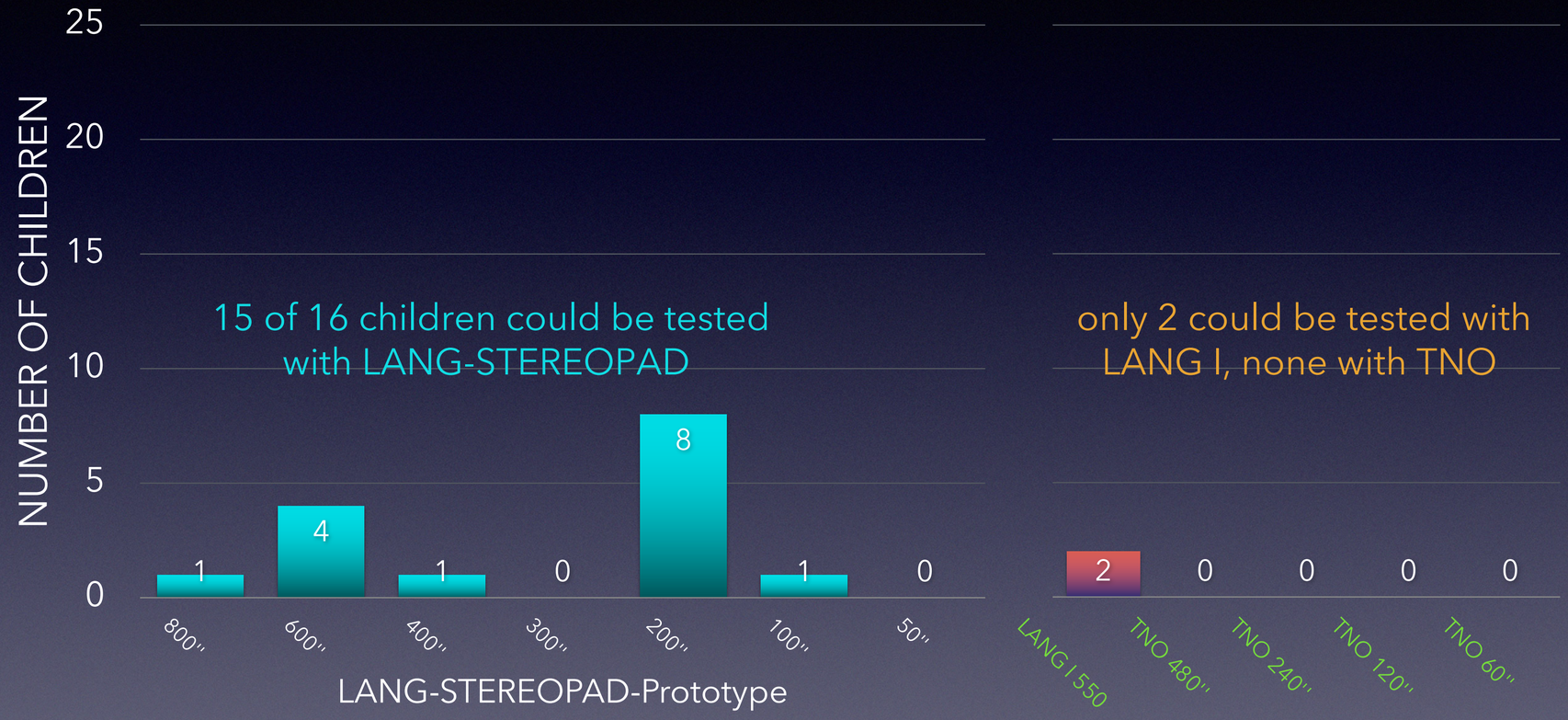


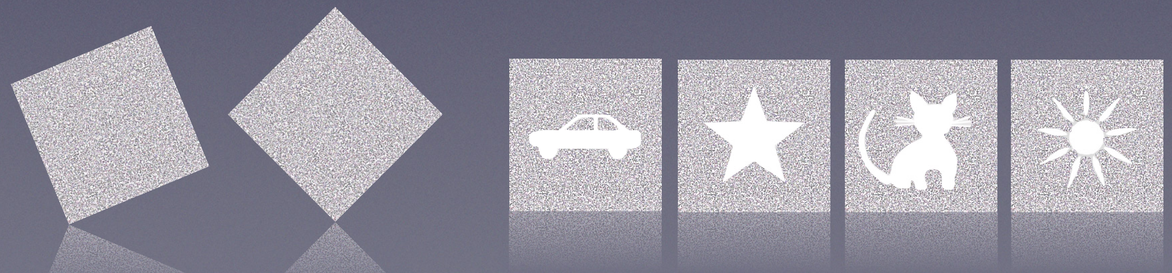
A.Piantanida, Cernobbio-Como, Italy, 2017

LANG-STEREOTEST®

STEREO THRESHOLDS ON LANG-STEREOPAD (PROTOTYPE), LANG-STEREOTEST I AND TNO

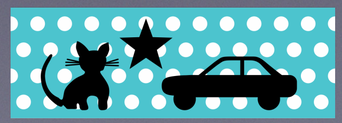
AGE GROUP: 1 TO 2 YEARS N=16





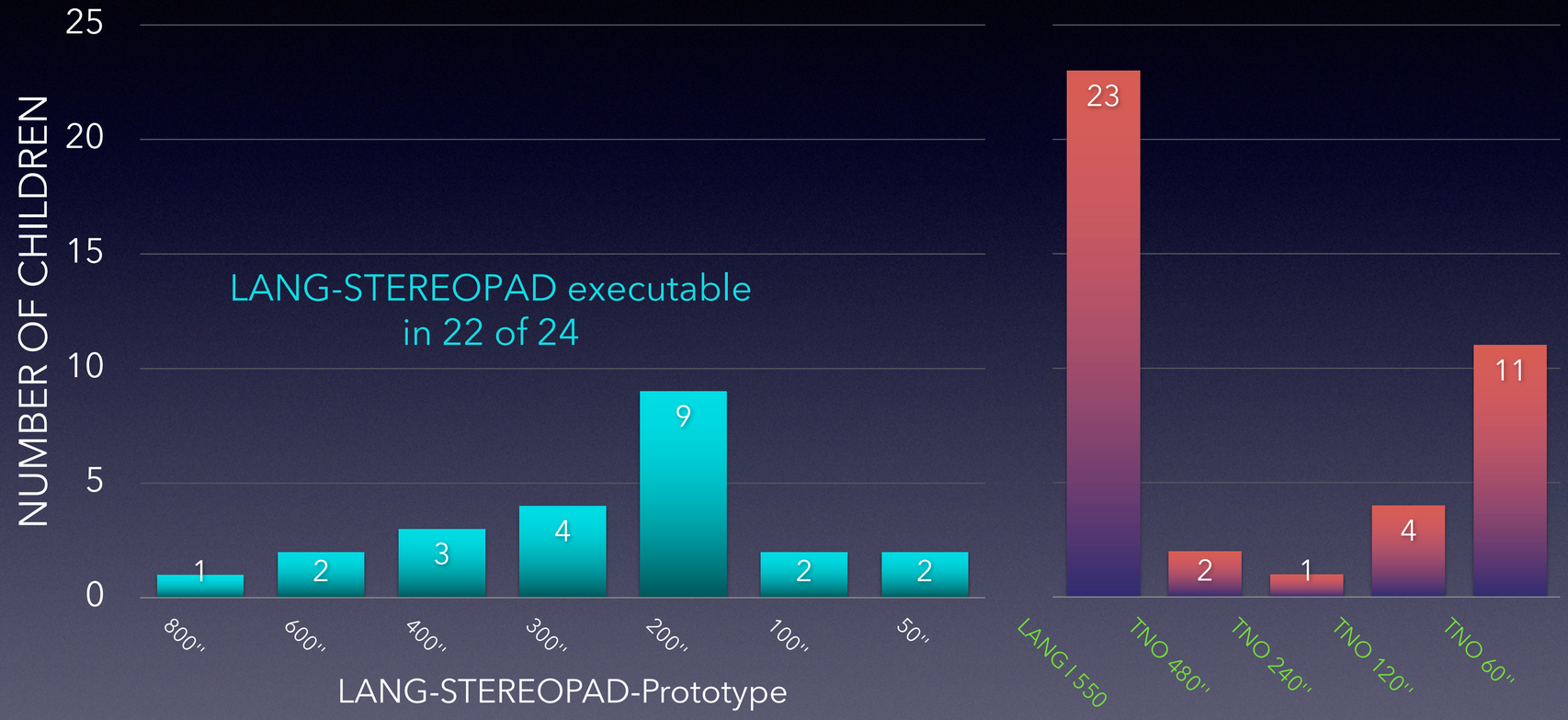
A.Piantanida, Cernobbio-Como, Italy, 2017

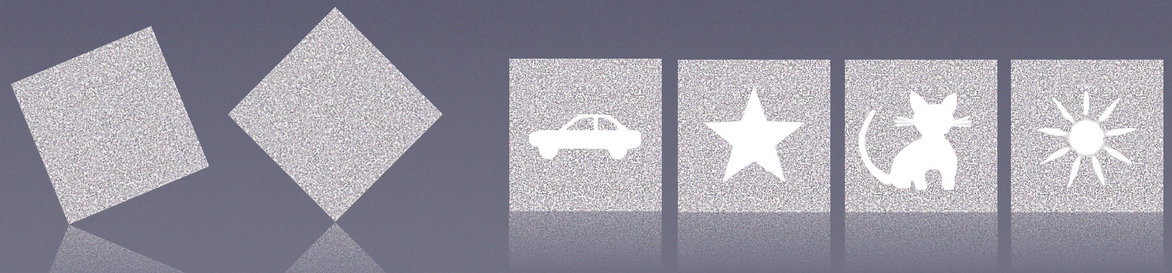
LANG-STEREOTEST®



STEREO THRESHOLDS ON LANG-STEREOPAD (PROTOTYPE), LANG-STEREOTEST I AND TNO

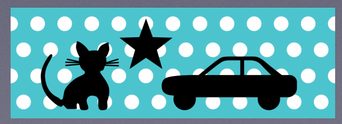
AGE GROUP: 2 TO 3 YEARS N=24





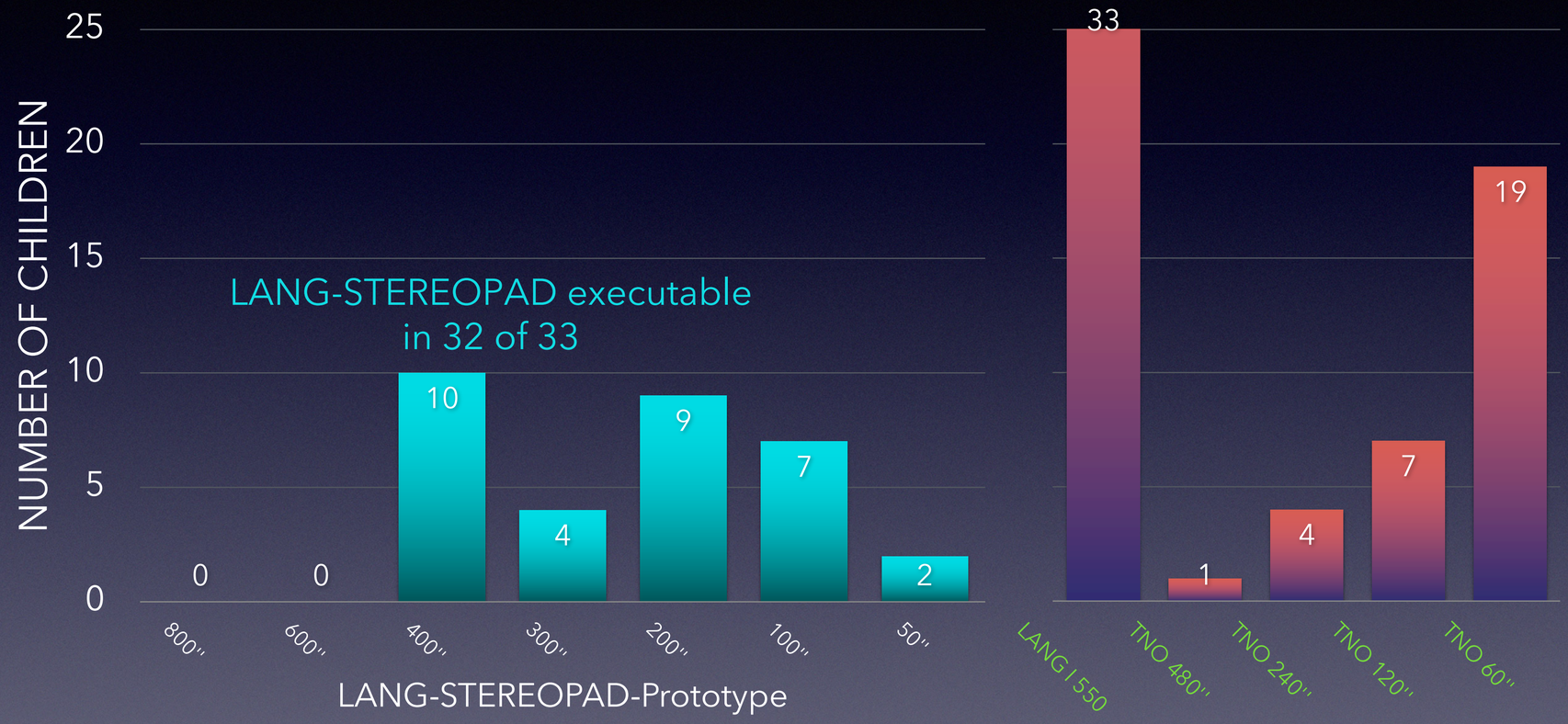
A.Piantanida, Cernobbio-Como, Italy, 2017

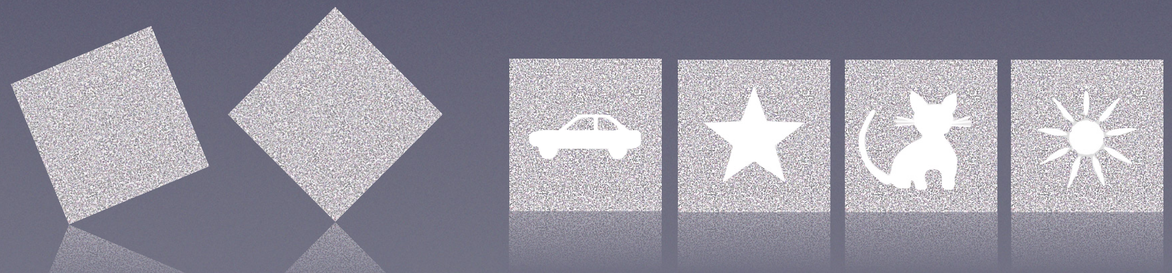
LANG-STEREOTEST®



STEREO THRESHOLDS ON LANG-STEREOPAD (PROTOTYPE), LANG-STEREOTEST I AND TNO

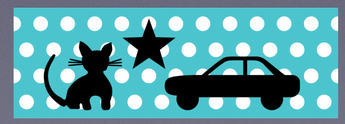
AGE GROUP: 3 TO 4 YEARS N=33





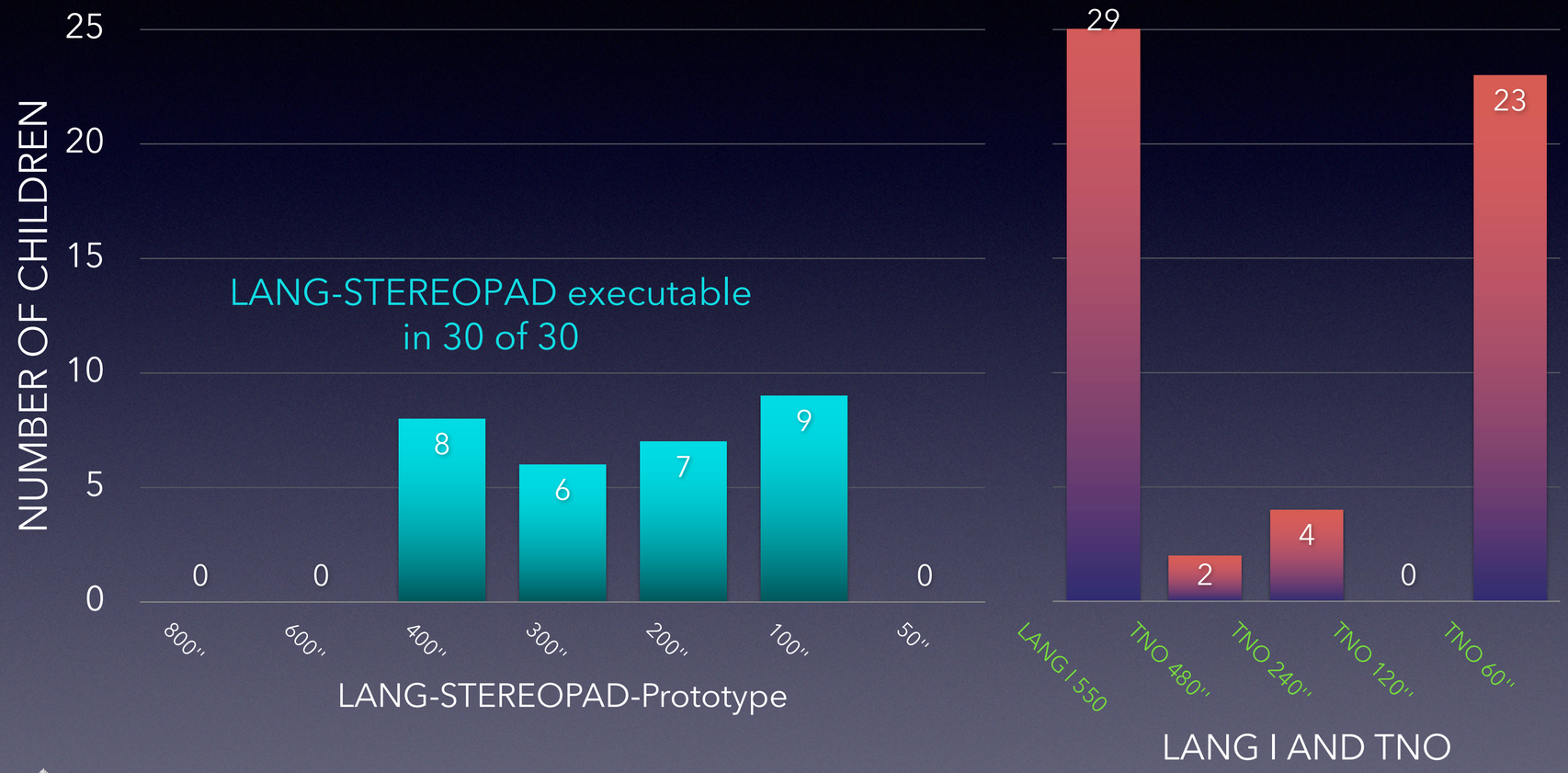
A.Piantanida, Cernobbio-Como, Italy, 2017

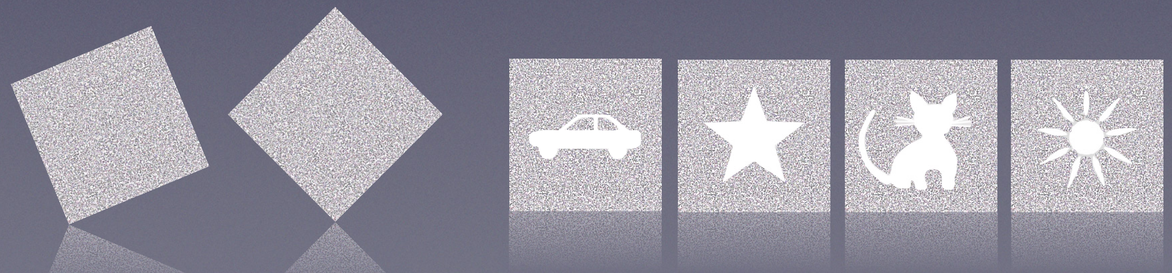
LANG-STEREOTEST®



STEREO THRESHOLDS ON LANG-STEREOPAD (PROTOTYPE), LANG-STEREOTEST I AND TNO

AGE GROUP: 4 TO 5 YEARS N=30





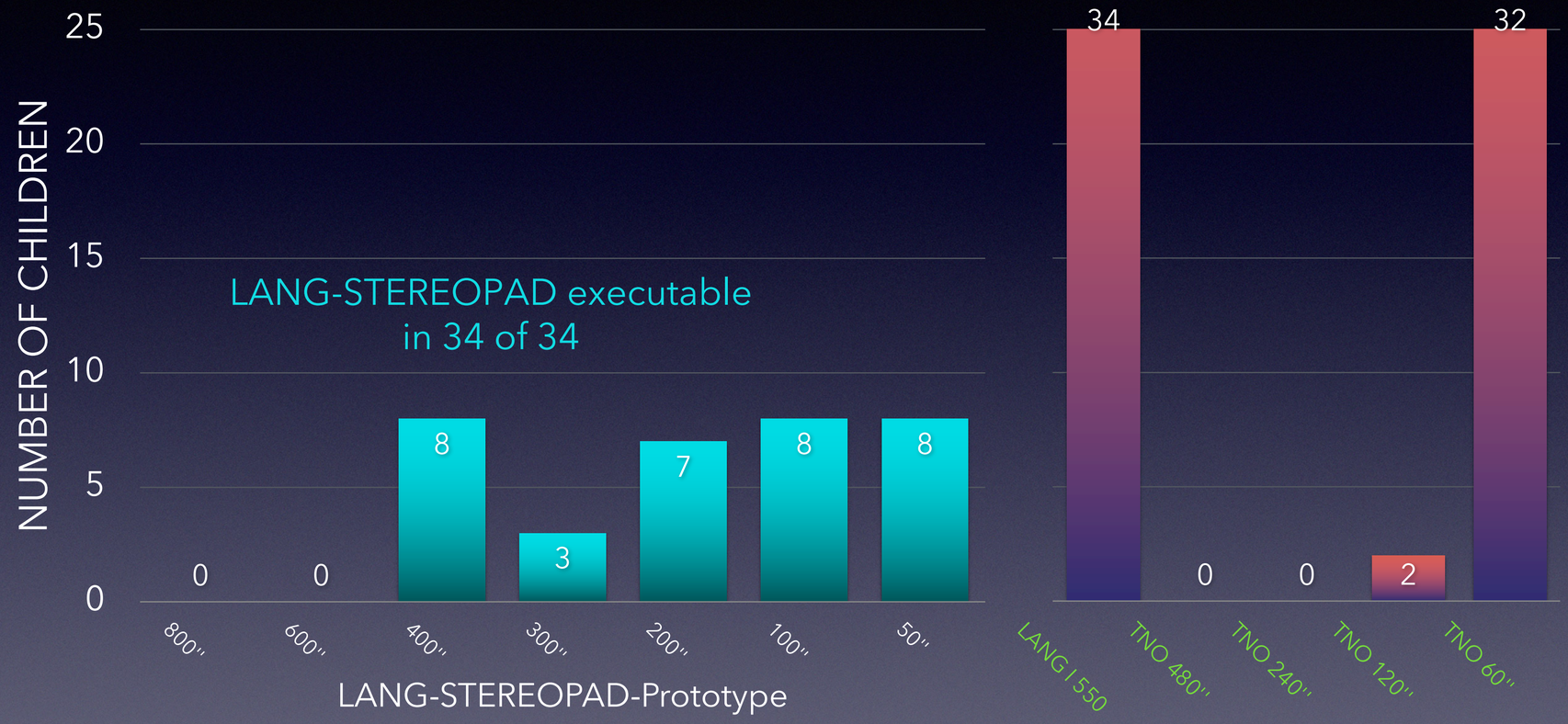
A.Piantanida, Cernobbio-Como, Italy, 2017

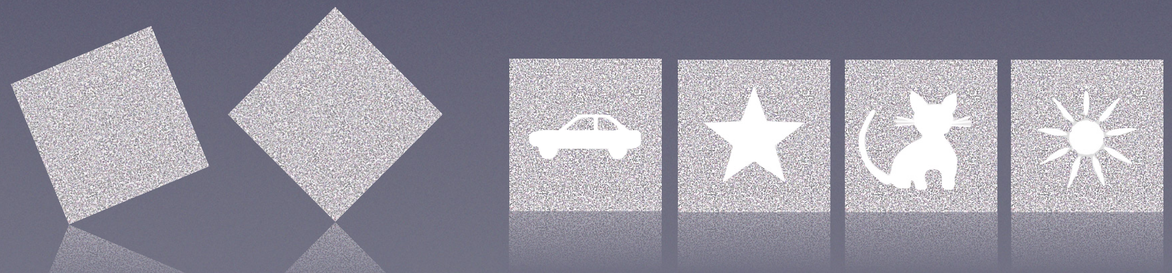
LANG-STEREOTEST®



STEREO THRESHOLDS ON LANG-STEREOPAD (PROTOTYPE), LANG-STEREOTEST I AND TNO

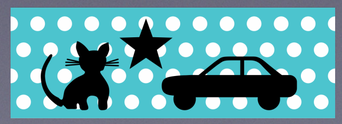
AGE GROUP: 5 TO 6 YEARS N=34





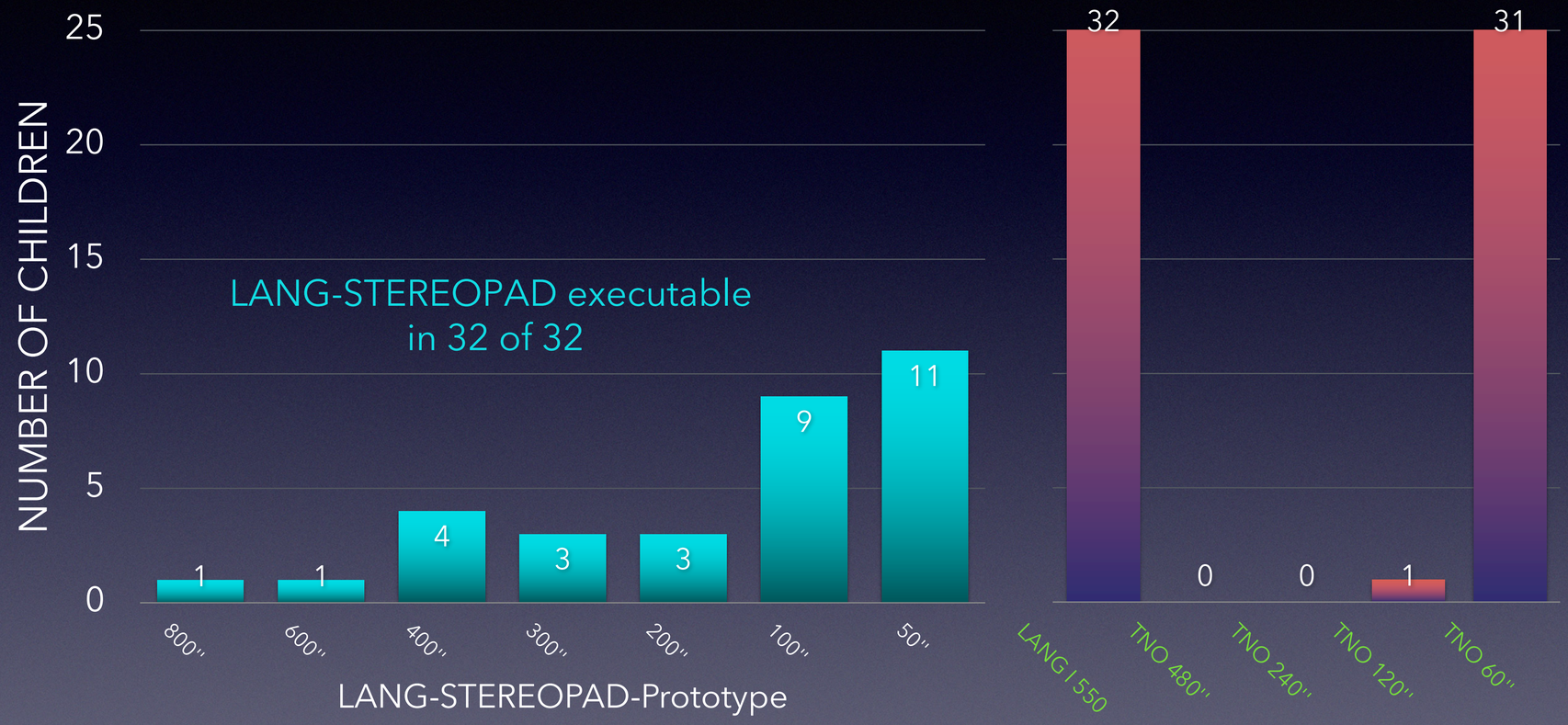
A.Piantanida, Cernobbio-Como, Italy, 2017

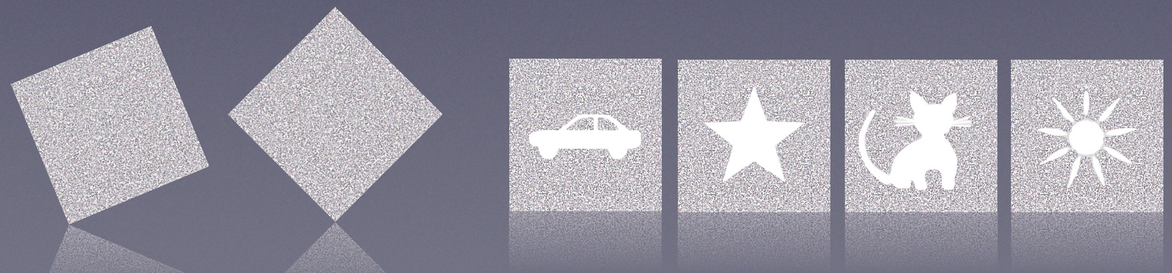
LANG-STEREOTEST®



STEREO THRESHOLDS ON LANG-STEREOPAD (PROTOTYPE), LANG-STEREOTEST I AND TNO

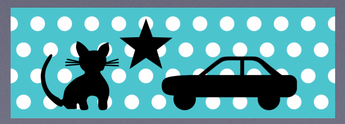
AGE GROUP: 6 TO 7 YEARS N=32





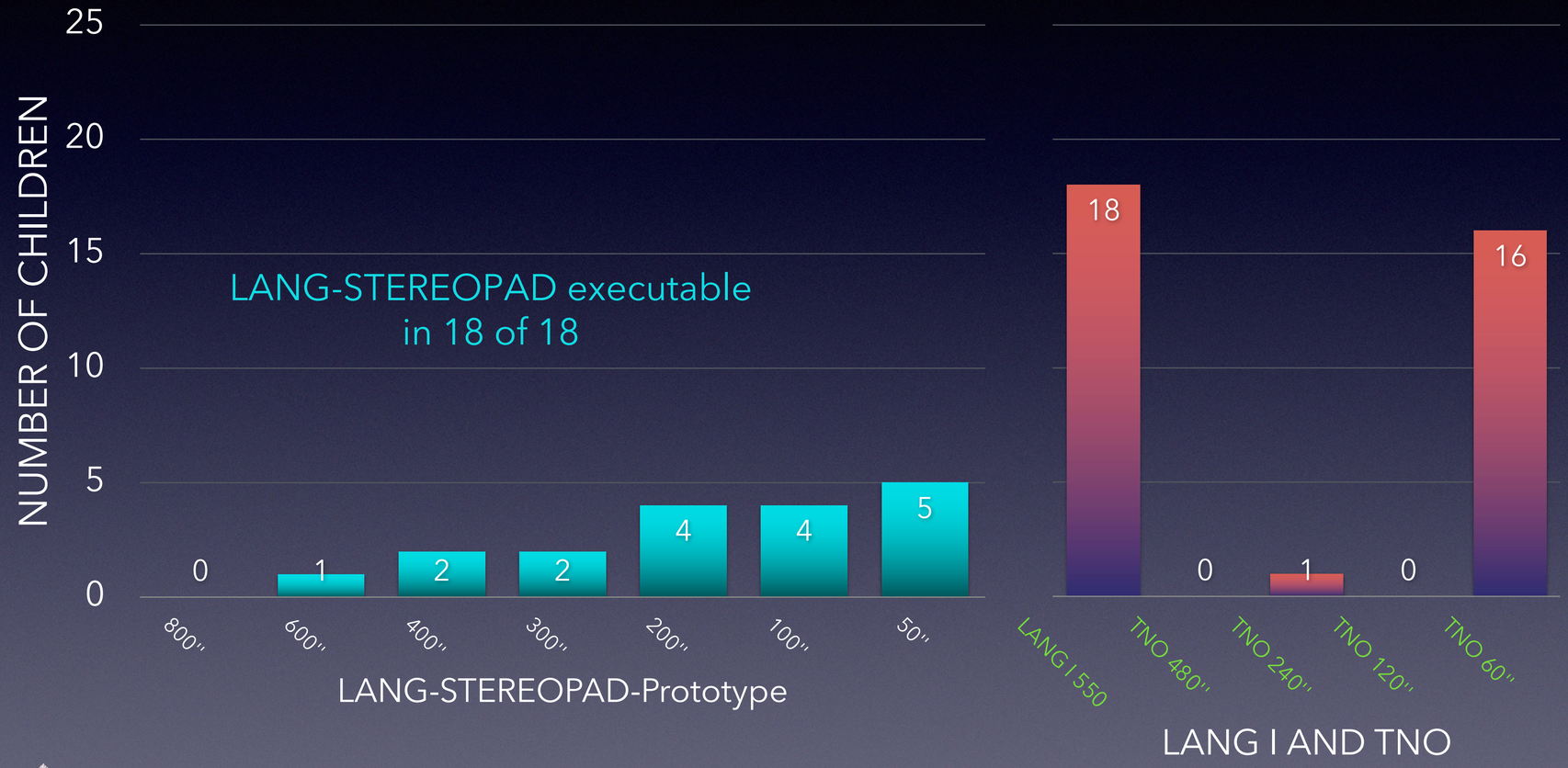
A.Piantanida, Cernobbio-Como, Italy, 2017

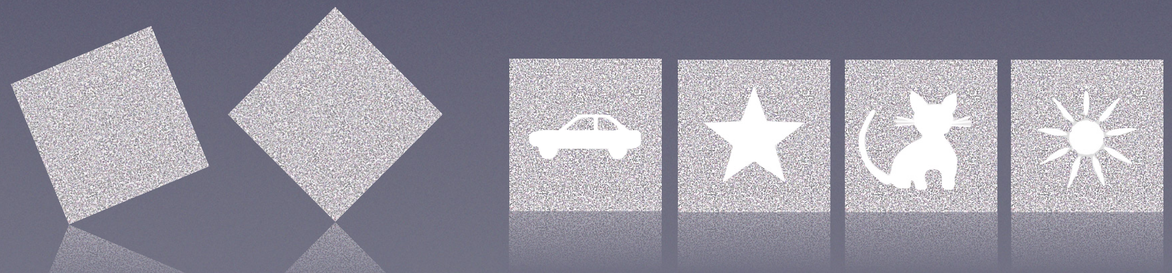
LANG-STEREOTEST®



STEREO THRESHOLDS ON LANG-STEREOPAD (PROTOTYPE), LANG-STEREOTEST I AND TNO

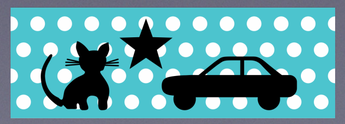
AGE GROUP: 7 TO 8 YEARS N=18





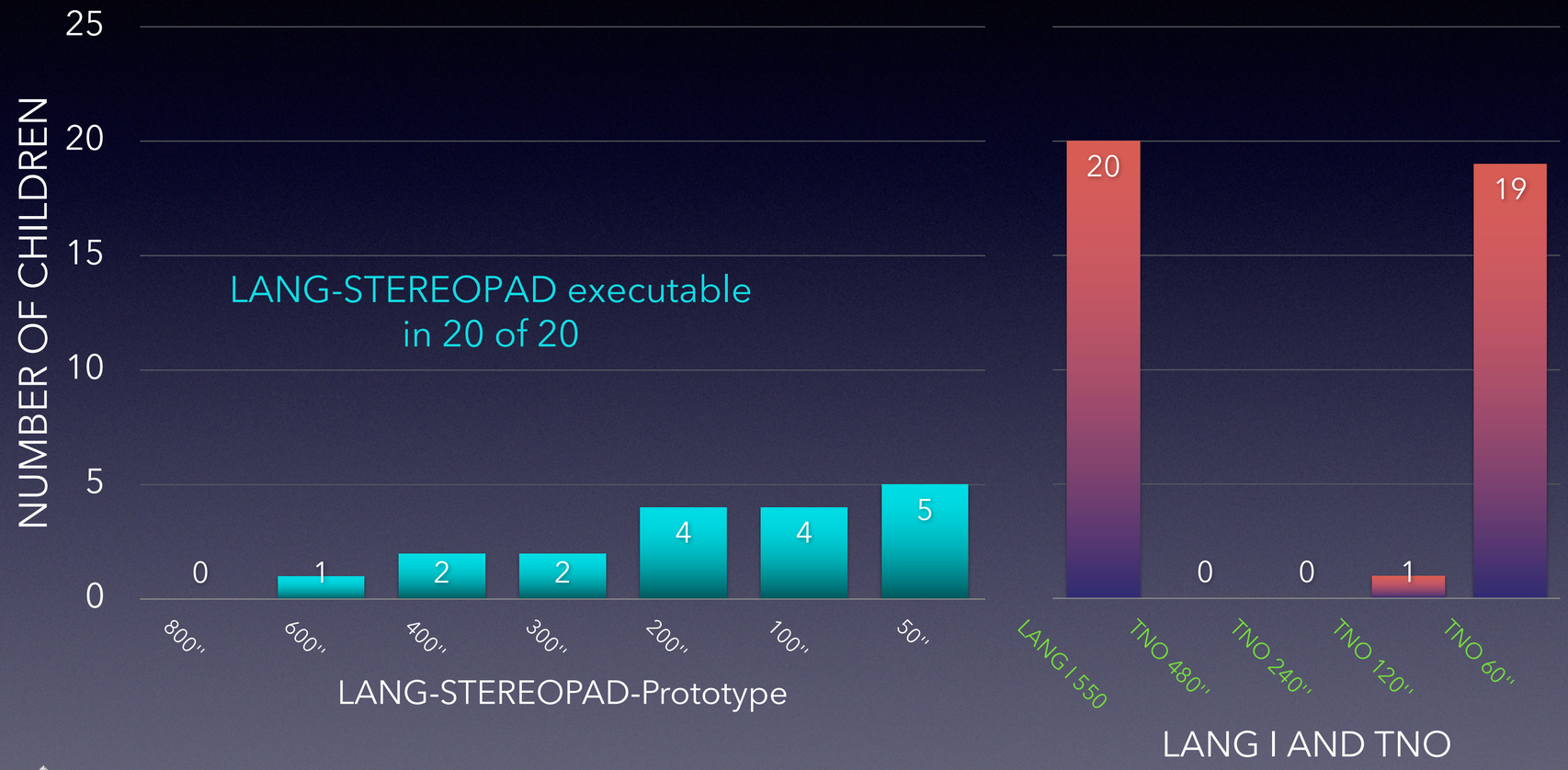
A.Piantanida, Cernobbio-Como, Italy, 2017

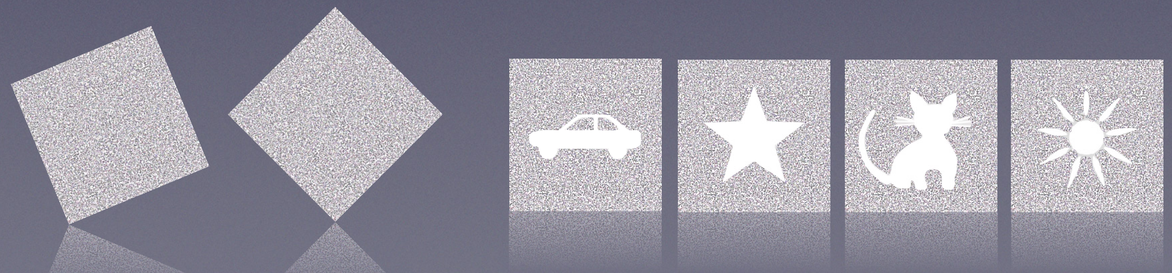
LANG-STEREOTEST®



STEREO THRESHOLDS ON LANG-STEREOPAD (PROTOTYPE), LANG-STEREOTEST I AND TNO

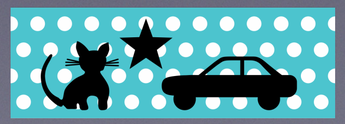
AGE GROUP: 8 TO 9 YEARS N=20





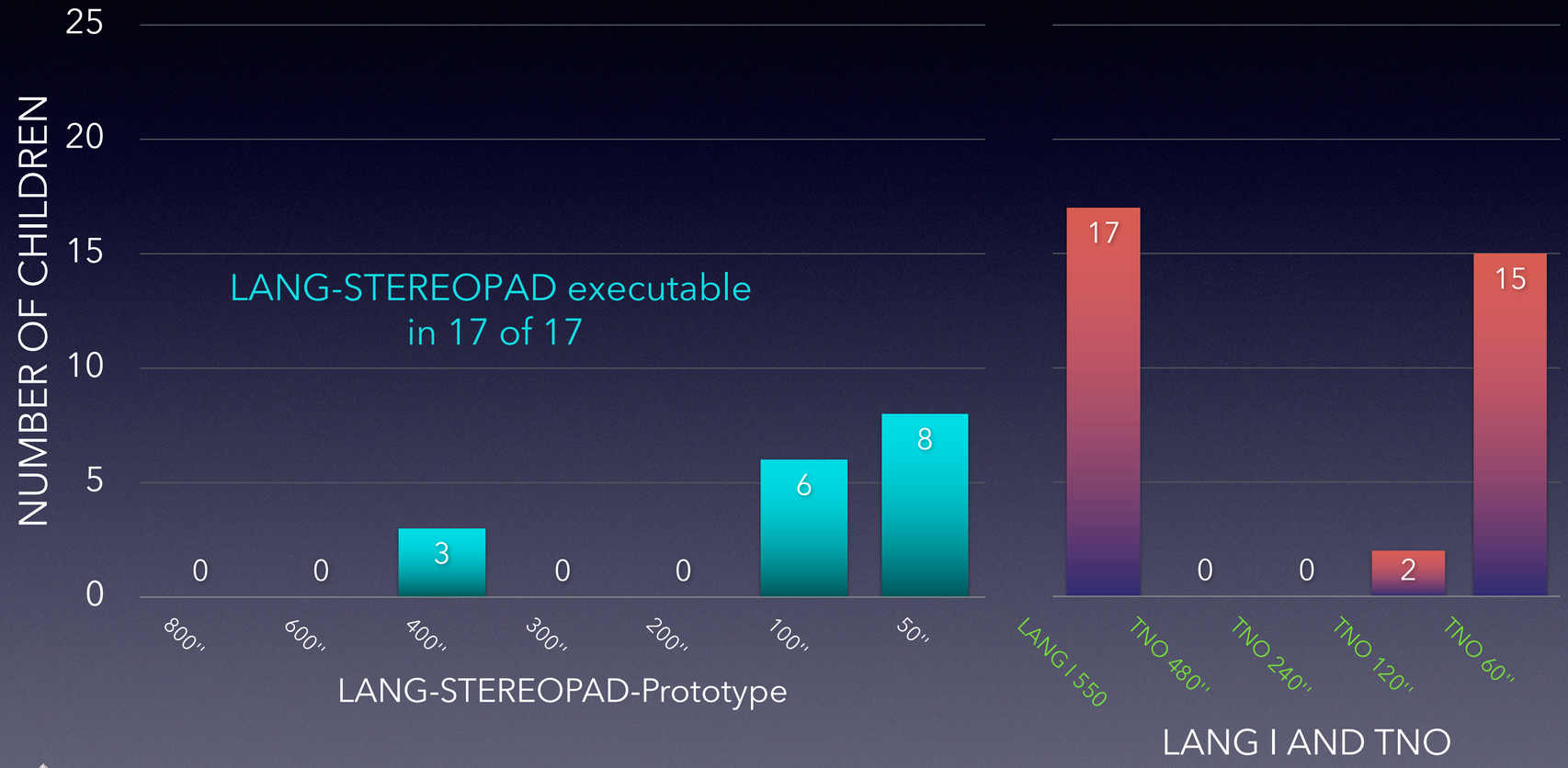
A.Piantanida, Cernobbio-Como, Italy, 2017

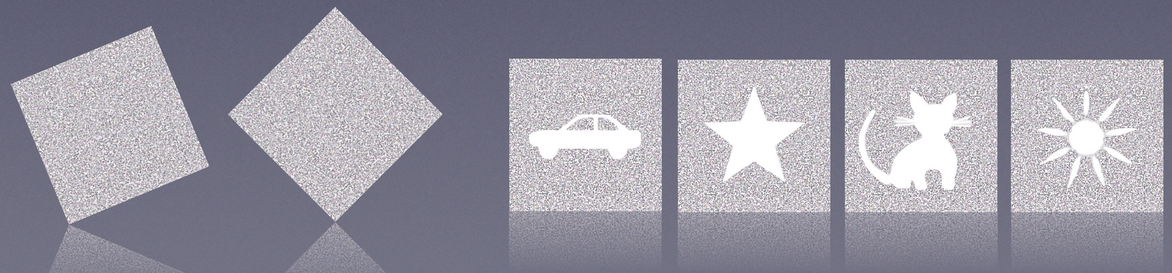
LANG-STEREOTEST®



STEREO THRESHOLDS ON LANG-STEREOPAD (PROTOTYPE), LANG-STEREOTEST I AND TNO

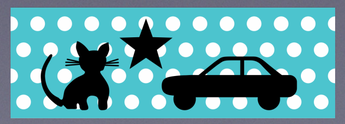
AGE GROUP: 9 TO 10 YEARS N=17





A.Piantanida, Cernobbio-Como, Italy, 2017

LANG-STEREOTEST®



Study 2:
Comparative analysis of the Lang Stereopad in a non-clinic population

Aim: New methods of measurement require testing to evaluate test validity. This study compares stereoacuity results of the Lang Stereopad to other common clinical stereoacuity assessments in a normal vision population.

Methods: A prospective cross-sectional study was conducted comparing the Lang Stereopad stereoacuity results to results from the Lang II, Frisby, and TNO stereo tests. Mean stereoacuity values and their correlation with inter-ocular visual acuity difference were compared for each stereo test.

Results: 98 subjects (mean age of 33.5 years, SD 14.1; 39 males and 59 females) with normal parameters of visual function underwent multiple stereotest assessments. Median stereoacuity values were the lowest (i.e. more detailed stereoacuity) when using the Frisby stereotest (median 40”; 20–170” [minimum-maximum]) and TNO stereotest (median 60”; 15–480”). In comparison, medians were about double at 100” (50–800”) for the Lang Stereopad and greater at 200” (200–200”) for the Lang II stereotest. There was no correlation for each stereotest with interocular visual acuity differences.

Conclusions: The Lang Stereopad test is easy to administer and it has certain advantages such as no requirement for additional test glasses. It is a useful assessment to add to the clinical armamentarium for binocular assessment of stereopsis. The Lang Stereopad does not agree well with other stereo tests such as the TNO and Frisby but provides a greater stereoacuity test range than the Lang II. The Lang Stereopad now requires testing in a clinical population in which stereoacuity is a pre-requisite part of the assessment.

Rowe et al. Comparative analysis of the Lang-Stereopad in a non-clinical population. Strabismus 2019

LANG-STEREOTEST®

Study 3: Microtropia

SAMPLE: 217 children of a paediatric ophthalmology practice, aged 3- 10 years, with suspected microstrabismus.

Cut-off stereo threshold esotropia on Lang Stereopad: only STAR(1000'') detected.

Test results on Lang Stereopad:

"Esotropic" screening Lang Stereotest I:	n= 45 43 positive*	2 false-negative
"Orthotropic" Screening Lang Stereotest I:	n=172 166 negative	6 false-positive

*positive: object not detected - no stereopsis (only in this study)

Piantanida et al. Statistical Evaluation in Pediatric Patients of the New Lang-Stereopad Test: A Preliminary Report

LANG-STEREOTEST®

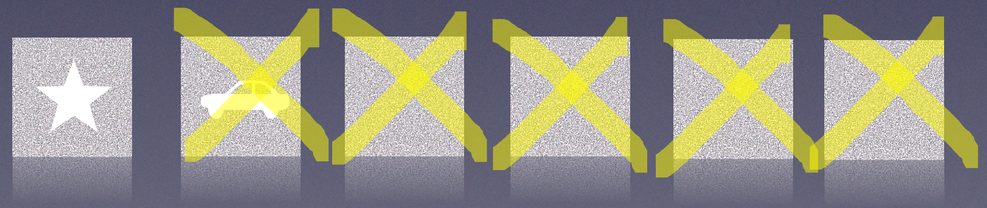
Study 3: Microtropia

EXAMINATION:
1. Orthoptic examination, corneal reflexes, cover test, motility.
2. Lang-Stereo Test I
3. Determination of stereo threshold on the long stereo pad.

Two subgroups:
"Esotropic": children who did not recognise the car (550''): n= 45
"Orthotropic": children who recognised all 3 test objects: n=172



Cut-off Lang-Stereopad: 1000'' (STAR)



Piantanida et al. Statistical Evaluation in Pediatric Patients of the New Lang-Stereopad Test: A Preliminary Report

LANG-STEREOTEST®

Study 3: Microtropia

Sample: 217 children suspected of having microstrabismus.
Age group: entire sample: 3 to 10 years , subsamples: 3 to 5 years, 6 to 10 years

Table 1 Summary of the statistical results according to ages

Statistical Value Of Lang Stereopad Test According Different Ages Groups					
3 years to 10 years (217 pts)		**3 years to 5 years** (76 pts)		**6 years to 10 years** (141 pts)	
Sensitivity	95,5%	Sensitivity	93%	Sensitivity	87%
Specificity	97%	Specificity	93%	Specificity	98%
Positive predictive value	87%	Positive predictive value	77%	Positive predictive value	92%
Negative predictive value	98%	Negative predictive value	98%	Negative predictive value	96%
Likelihood Ratio	27,39	Likelihood Ratio	14,23	Likelihood Ratio	48,1
Pre test probability	5%	Pre test probability	5%	Pre test probability	5%
Post test probability	57,80%	Post test probability	41,58%	Post test probability	70,63%

Piantanida et al. Statistical Evaluation in Pediatric Patients of the New Lang-Stereopad Test: A Preliminary Report

LANG-STEREOTEST®

Study 3: Microtropia

Sample: 217 children suspected of having microstrabismus.
Age group: entire sample: 3 to 10 years , subsamples: 3 to 5 years, 6 to 10 years

Conclusion

"The Lang-Stereopad is a simple test with high specificity and sensitivity. The positive and negative predictive values correspond to a test with good reliability in young children. Likelihood ratios are commonly used in the analysis of a test's usefulness, as an indirect measure of a test's effectiveness in real-world people (9-10-11). The likelihood ratios highlight the importance of the Lang-Stereopad test in diagnosing small-angle isotropy in children. The findings are comparable to the TNO test for children aged 3 to 10 years (3). Further studies need to be conducted to test the efficacy and effectiveness of the Lang-Stereopad in children younger than 3 years."

Translated with DeepL

Paper presented at the 40th Meeting of the European Strabismological Association ESA, 5th-8th June 2019.
Piantanida et al. Statistical Evaluation in Pediatric Patients of the New Lang-Stereopad Test: A Preliminary Report

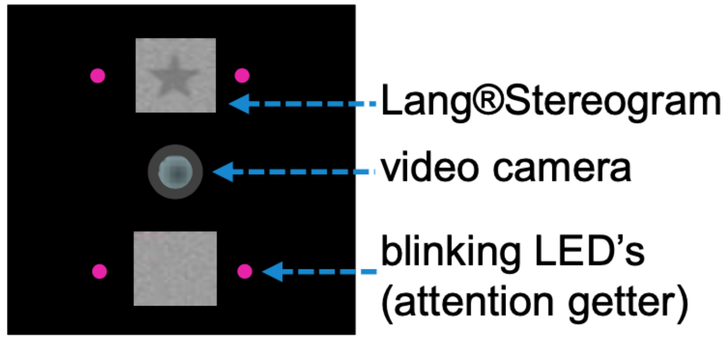
LANG-STEREOTEST®

Study 4: Development of Stereopsis from 4 months to 7 months

n=41 babies at 4 and 7 months
Preferential Looking Method: Star 800'' and blind test card

Apparatus: Infants were seated on their parents' lap in front of a puppet stage at a distance of about 30 cm (stereo test) and 50 cm (object recognition) from the stimuli.

Stereo Test: Stereograms of the Lang Stereotest® (800'' disparity) were presented in two trials according to a preferential looking design:



Stimulus Presentation

6 s (min.) – 60 s (max.);
trial end: 2 s look away
order of target position (top/bottom) counterbalanced

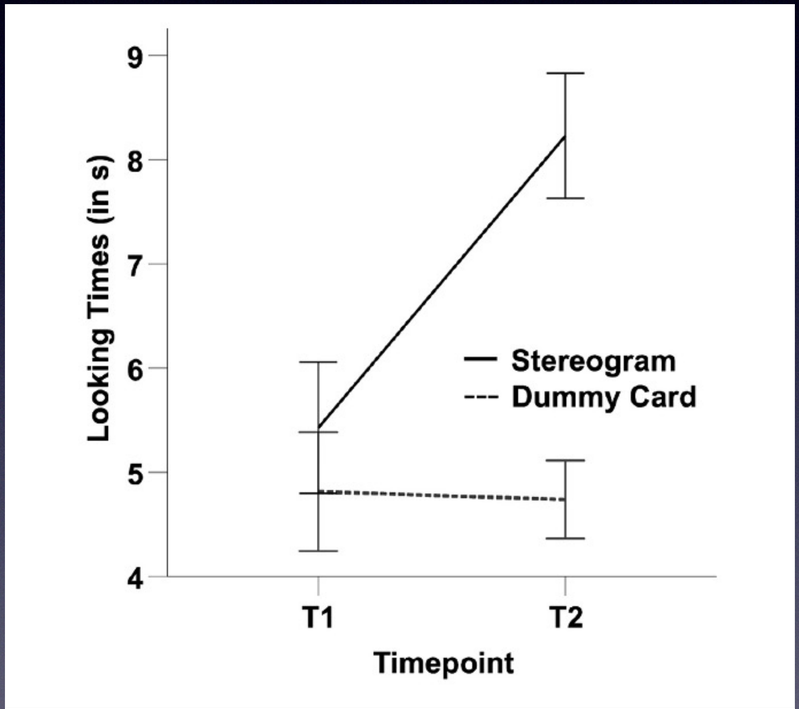
- 80 completely healthy babies tested (38 girls, 42 boys)
- 2 babies excluded because of querulousness
- All babies tested at 7 months
- 41 babies tested longitudinally at 4 and 7 months of age
- No significant differences between gender and mean age at T2

Development of stereo vision in young infants. Röthlisberger, Frick. Infancy 2020

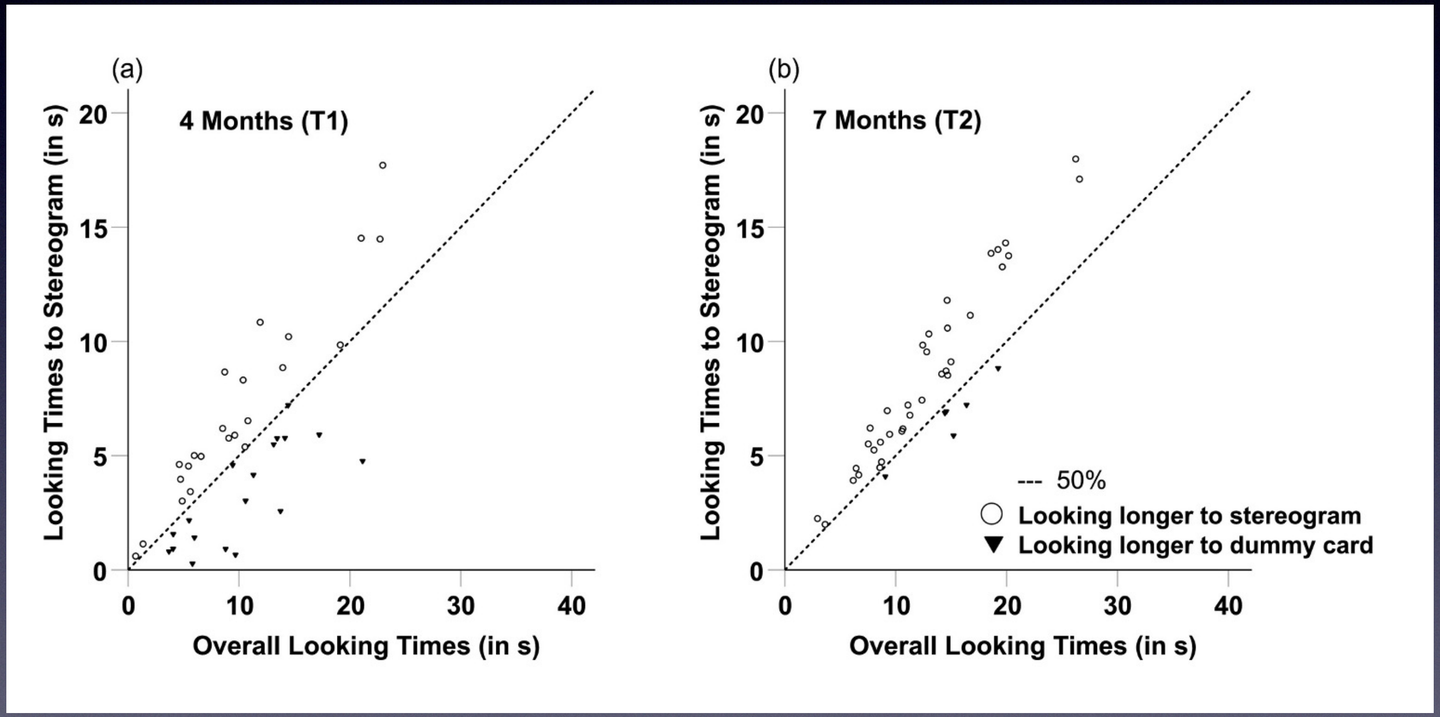
LANG-STEREOTEST®

Study 4: Development of Stereopsis from 4 months to 7 months

Looking Times in s at T1 and T2



Looking Times at Stereogram vs. Overall Looking Time



Development of stereo vision in young infants. Röthlisberger, Frick. Infancy 2020

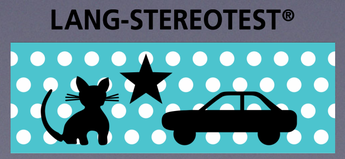
LANG-STEREOTEST®

Study 4: Development of Stereopsis from 4 months to 7 months

Conclusions:

- First investigation of the usability of a commercially available stereotest in a standardised experimental setting and with a large sample of young babies.
- Number of babies with preference for the stereogram increased significantly from 4 to 7 months.
- Increase was also confirmed in group analyses.
- Representative results as no children were excluded and dropout rate very low.
- Excellent consent rate shows reliable and objective measurement.
- Stereocard tests of the Lang-Stereopad® are well suited for use in experimental settings and provide an easily available tool for testing the depth sensitivity of very young babies in future research.

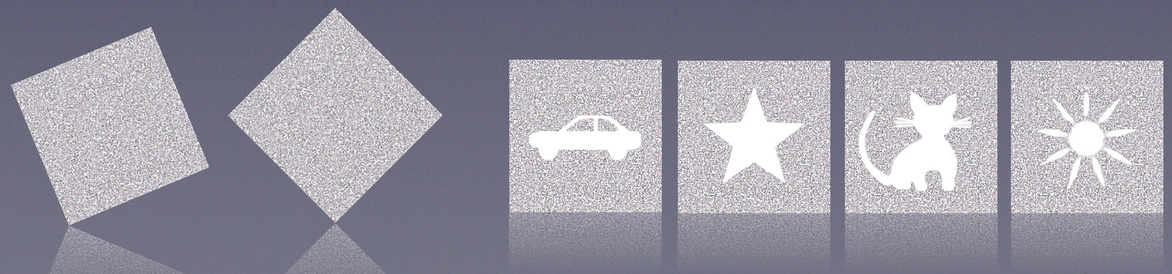
Development of stereo vision in young infants. Röthlisberger, Frick. Infancy 2020



LANG-STEREOPAD® IN DAILY USE

GIRL 3 YRS.
AT PEDIATRICIAN OFFICE

DURATION OF VIDEO-CLIP: 4’30’’





LANG-STEREOPAD® IN DAILY USE

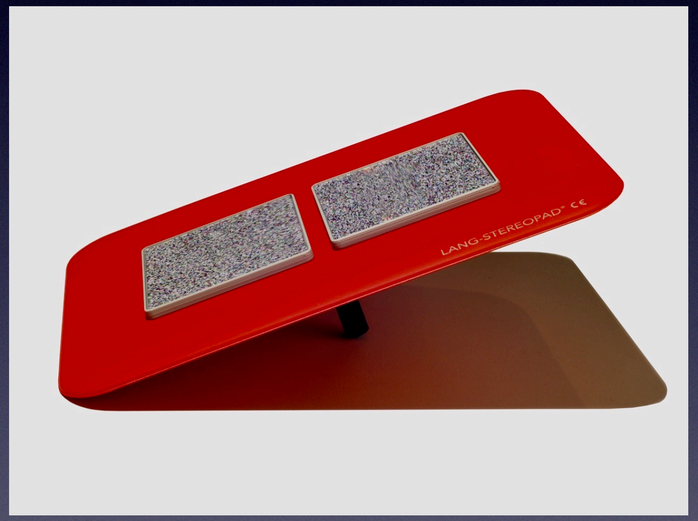


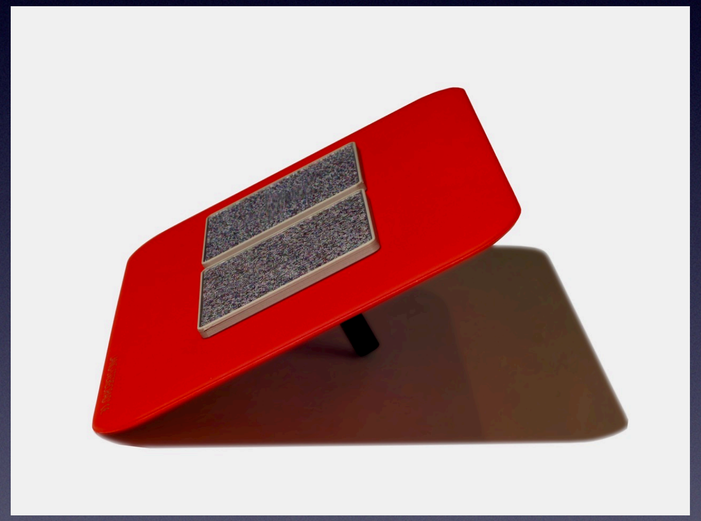
LANG-STEREOTEST®

MAGNETIC SUPPORT

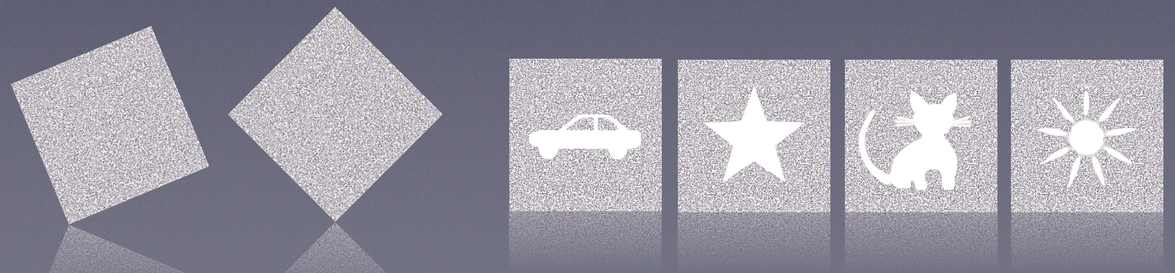


Table use in 2 positions, hand use









LANG-STEREOTEST®

LANG-STEREOPAD® KIT



1 double sided test panel, red, PVC, 21x15cm

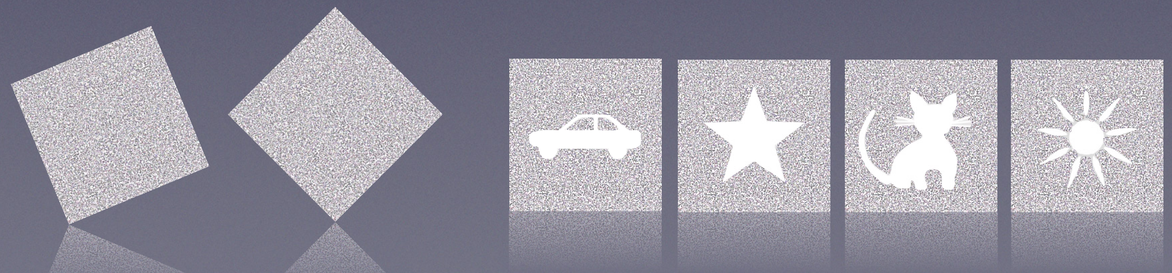
6 magnetic test cards, grey

Box

Instruction brochure 20p in E/J

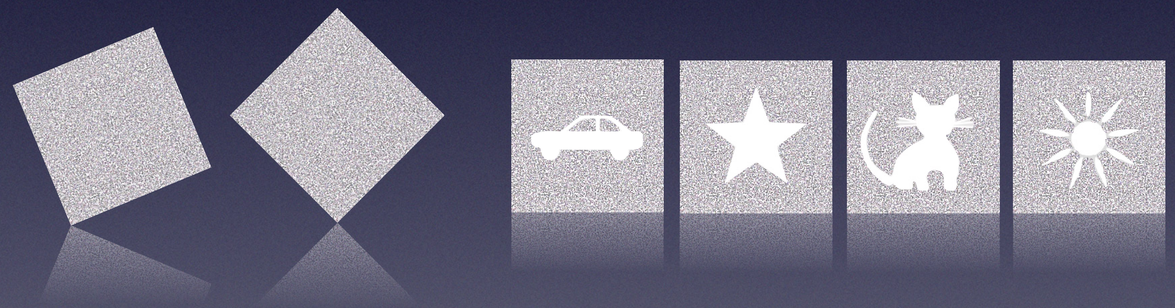
Magnetic monopod support (not included)

total weight: 350g



LANG-STEREOTEST®

THANK YOU FOR YOUR ATTENTION



LANG-STEREOPAD®

