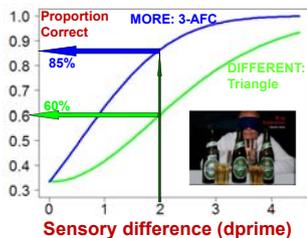# R – packages for *sensometrics* by DTU Compute

R
Running on as well Linux platforms as on Windows and Mac, R is globally the fastest growing environment for statistical computing. Currently the largest repository(CRAN) hosts almost 5000 add-on R packages and this number increases at an exponential rate and has done so for many years. A decade ago only 200 R packages existed. . In this poster we give an overview of the currently **five R-packages** developed by us that are particularly relevant for sensory and consumer data: *sensR*, *opair*, *SensMixed*, *lmerTest* and *ordinal*.

sensR
Thurstonian models for sensory discrimination
Provides methods for sensory discrimination methods; duotrio, tetrad, triangle, 2-AFC, 3-AFC, A-not A, same-different and 2-AC. This enables the calculation of d-primes, standard errors of d-primes, sample size and power computations, and comparisons of different d-primes. Methods for profile likelihood confidence intervals and plotting are included.
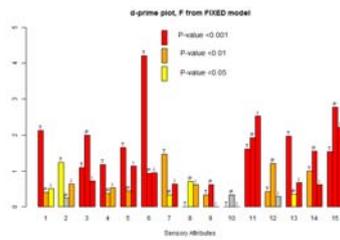

opair
Ordinal paired comparisons analyzed with Thurstonian models
This package provides methods for analysis of paired comparisons evaluated on a ordinal rating scale. The main function, opair, will estimate d-prime for a series of descriptors on one or more products.
For instance, compare products A and B on sweetness using the scale:

Rstudio: A great (free) way of running R:
http://www.rstudio.com

SensMixed
Mixed effects modelling for sensory and consumer data
Provides functions that facilitate more user friendly analysis of Sensory and Consumer data:
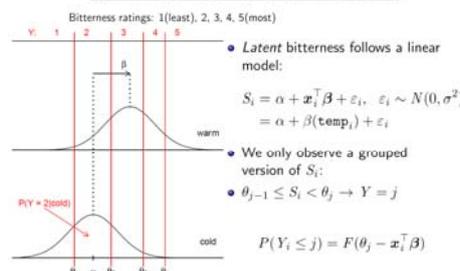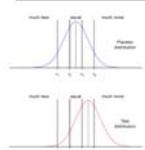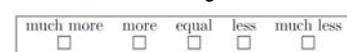
1. Easy multi (sensory) attribute complex mixed models visualized the "PanelCheck" way
2. Includes the Mixed Assessor Model (MAM)
   1. Generalized setting/version
   2. Simple/Basic setting/version
3. Includes newly developed multi-attribute average effect plots with d-prime like interpretation
4. For consumer data: Semi-automated global model selection

Understanding models for ordinal data:

lmerTest
Tests for random and fixed effects for linear mixed effect models
The package provides different kinds of tests on lmer objects (of lme4 package). The tests comprise type 3 and type 1 F tests for fixed effects, LRT tests for random effects, calculation of population means for fixed factors with confidence intervals and corresponding plots.

Automated analysis of fixed and random effects in (complex) mixed models:
1. Specify largest possible initial model
In ONE step get: *(for e.g. sensory data)*
Random effects analysis:

	Chi.sq	Chi.DF	elim.num	p.value
Assessor:TVset:Picture	0.00	1	1	1.000
Repeat:Picture	0.00	1	2	1.000
Repeat	0.10	1	3	0.748
Assessor	0.32	1	4	0.572
Assessor:TVset	69.52	1	KEEP	<0.001
Assessor:Picture	3.12	1	KEEP	0.077
Repeat:TVset	4.99	1	KEEP	0.025

Fixed effects analysis:
(using obtained result for the random part)

	F.value	elim.num	Pr(>F)
TVset	3.90	KEEP	0.042
Picture	1.37	KEEP	0.281
TVset:Picture	4.47	KEEP	<0.001

ordinal
Regression Models for Ordinal Data
This package implements cumulative link (mixed) models also known as ordered regression models, proportional odds models, proportional hazards models for grouped survival times and ordered logit/probit/... models. Estimation is via maximum likelihood and mixed models are fitted with the Laplace approximation and adaptive Gauss-Hermite quadrature. Multiple random effect terms are allowed and they may be nested, crossed or partially nested/crossed. Restrictions of symmetry and equidistance can be imposed on the thresholds (cut-points).

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