



Constructs and Latent Variables: Measurement Conditions

Measurement is the standardized process of assigning numbers or other symbols to certain characteristics of the objects of interest, according to some pre-specified rules.

Necessary conditions:

1. Unambiguous: There must be a one-to-one correspondence between the symbol and the characteristic in the object that is being measured.
2. Consistent: The rules for assignment must be invariant over time and the objects being measured.



male = 0 | female = 1 | diverse = 2

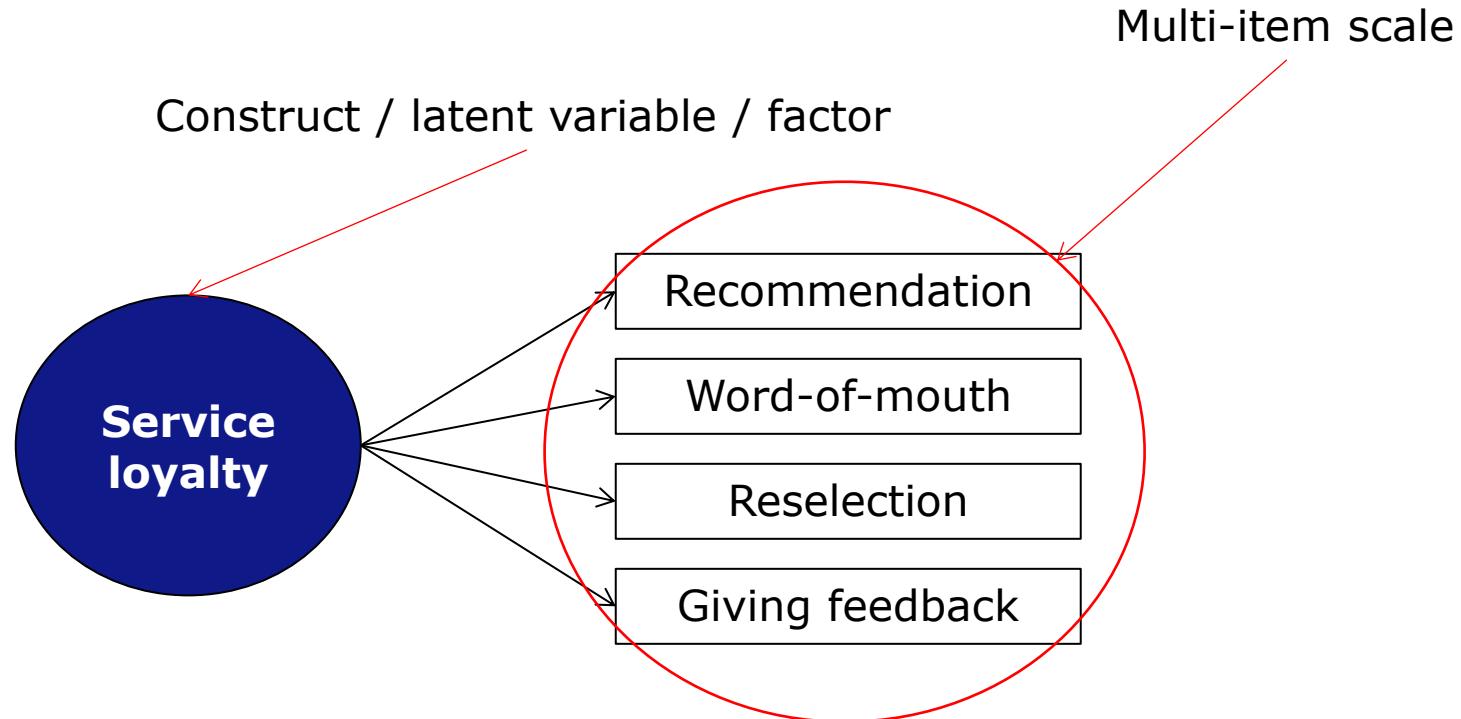


Unit sales in millions

But what about more abstract concepts such as attitudes or perceptions?



Constructs and Latent Variables

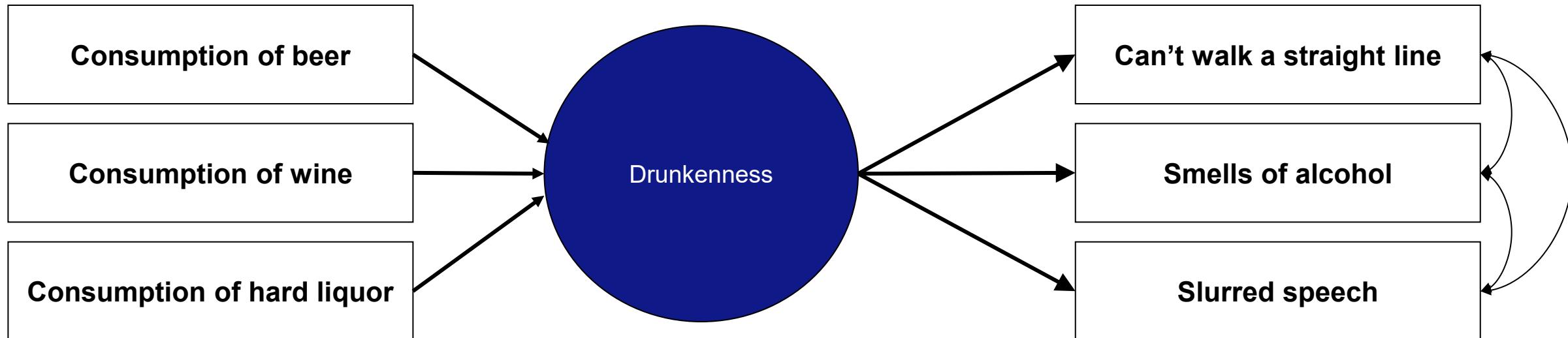


Rather than using individual items in subsequent analysis, we would use the mean or sum of the four items as an indication of each respondent's service loyalty



4.1 Latent Variable Modeling

Constructs and Latent Variables: Formative and Reflective Construct Measures



Formative Measure:

Changes in one or more of the indicators “causes” changes in the latent variable

Reflective Measure:

Assumption: Changes in the latent variable directly “cause” changes in the associated indicators



Constructs and Latent Variables: Where can I Find Measurement Scales?



Feeling anxious: The dark side of checkout charity solicitations

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ARTICLE INFO

Keywords:
Checkout charity
Anxiety
Corporate social responsibility
Frontline encounter
Frontline employees
Frontline interface

ABSTRACT

Research and practice often suggest that checkout charity campaigns are win-win-win for retailers, customers, and causes. The current investigation offers a complementary perspective on the effects of checkout charity by uncovering evidence of undesirable customer responses triggered by such solicitations. Specifically, across four studies, we find that checkout charity solicitations induce customer anxiety, which in turn reduces their evaluation of the service encounter. In addition, our results reveal that such anxiety decreases during solicitation episodes when customers agree to donate; however, this occurs only when requests are made by frontline employees rather than self-checkout technologies. These results caution managers that checkout charity solicitations may have unintended consequences on customers that result in negative encounter outcomes, particularly in service environments in which the solicitation is technology-mediated.

Feeling Anxious: The Dark Side of Checkout Charity Solicitations
The entire point of asking "would you like to support [the local children's hospital] today..." is to guilt you into agreeing to donate. The intention is to trigger anxiety that the cashier or those around you won't think you're a good person if you don't make the donation.
– 35-year-old grocery store customer

Although checkout charity campaigns are seemingly a win-win-win for retailers, customers, and causes (Hessekkel, 2017), some frontline managers doubt that checkout charity campaigns have universally positive consequences. They argue that customers often contribute to such campaigns not to feel good about giving, but rather to avoid guilt from having refused to donate (Good Scout, 2016). Consistent with this potential evidence, recent research has demonstrated about the benefits of checkout charity solicitations specifically, prior work finds that shoppers who are asked to donate at checkout (versus not asked to donate) are less satisfied with retailers (Cheng, Nakata, & Kuo, 2019), hold negative sentiments toward checkout charity campaigns (Massetti, Mohr, & Murphy-Holahan, 2019), and engage in guilty pleasures (Giebelhausen, Lawrence, & Chun, 2020). As such, there appears to be growing concern about the potential drawbacks of checkout charity efforts. However, understanding why and when checkout charity campaigns have these undesirable consequences is still lacking. Moreover, prior research examining the checkout charity process has been

incomplete, focusing either on customer responses to the solicitation (versus no-solicitation) or the decision to donate (versus not donate). However, since customers experience the entirety of the checkout charity process, both the solicitation response and customer donation decision need to be considered together to fully understand the consequences of checkout charity. This represents an important knowledge gap in the literature. To address this gap, and to do so directly, our aim is to improve the theoretical understanding of the psychological processes that underlie checkout charity's undesirable consequences and to provide managers with actionable guidance regarding the net consequences (including costs and benefits) of checkout charity efforts. We begin our investigation by utilizing a critical incident technique (CIT) study to gain conceptual understanding of how customers respond to checkout charity solicitations. Through this exploratory work, we uncover that customers experience *anxiety* in response to checkout charity solicitations (Study 1). Building on this finding and relevant literature, we theorize that a checkout charity solicitation elicits anxiety, which in turn negatively impacts customers' evaluations of the service encounter. We also propose that customers' donation decisions in response to solicitations also impact customers' psychological states such that declining (agreeing) to donate increases (reduces) anxiety. Further, we predict that the solicitation interface (frontline employee versus self-service checkout) serves as a boundary condition to this latter (i.e., donation

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<https://doi.org/10.1016/j.jbusres.2021.07.050>
Received 18 February 2021; Received in revised form 22 July 2021; Accepted 25 July 2021
Available online 1 August 2021
0148-2963/Published by Elsevier Inc.

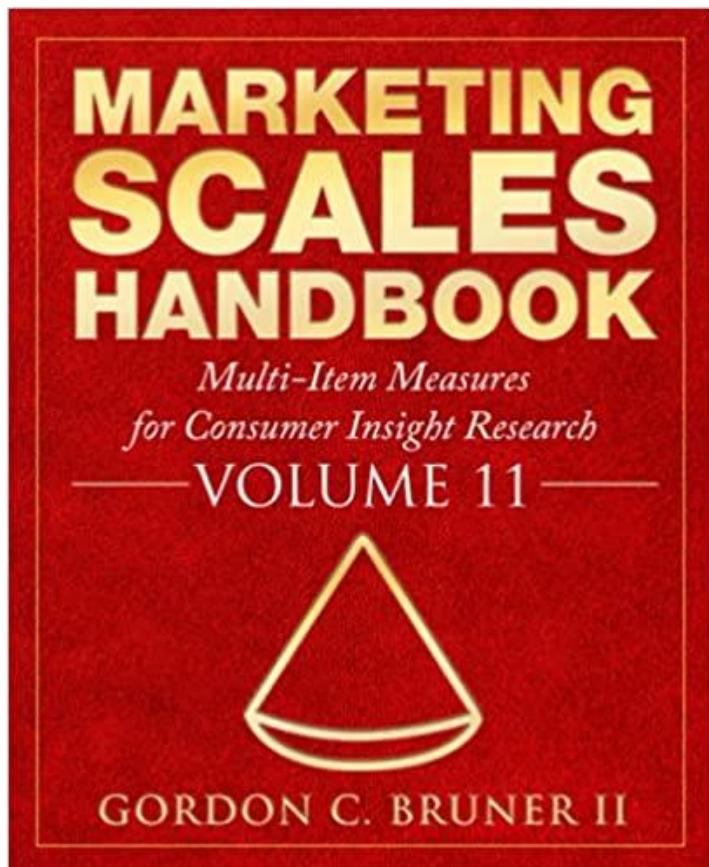
Table 2
Measurement scales.

	Cronbach Alpha (α)		
	Study 2	Study 3	Study 4
Customer Anxiety	0.96	0.94	0.96
<i>In FLE solicitation condition: This employee made me feel...</i>			
<i>In technology solicitation condition: During my visit to the grocery store, I felt...</i>			
Not pressured – Pressured			
Calm – Nervous (adapted from Spielberger et al., 1971)			
Untroubled – Troubled			
At ease – Uneasy			
Relaxed – Anxious			
Composed – Tense (adapted from Spielberger et al., 1971)			
Comforted – Panicky (adapted from Verbeke & Bagozzi, 2000)			
Service Encounter Evaluation (adapted from Ma & Dubé, 2011)	0.95	0.76	0.95
Scaled as: 1 = very unsatisfied, 7 = very satisfied			
How satisfied are you with the service received in this interaction? (Studies 2, 3)			
How satisfied are you with your checkout experience (Study 4)?			
Scaled as: 1 = very poor, 7 = excellent			
What is your overall evaluation of your interaction (Studies 2, 3)?			
What is your overall evaluation of your checkout experience (Study 4)?			
Guilt (adapted from Hibbert, Smith, Davies, & Ireland, 2007)	0.83	N/A	N/A
<i>During my visit to the grocery store, I felt...</i>			
GUILTY – NOT GUILTY			
Ashamed – Unashamed			
Sorry – Apologetic			
Remorseful – Unrepentant			
Accountable – Blameless			
Responsible – Irresponsible			
	N/A	N/A	N/A
Technology Anxiety (adopted from Meuter et al., 2003)			
I have avoided technology because it is unfamiliar to me			
1 = strongly disagree, 7 = strongly agree			

Notes: Same items were used across all studies with wording adapted to the context (e.g., fast food restaurant versus supermarket). Guilt was reverse coded for analysis purposes so that higher numbers reflect higher guilt levels.



Constructs and Latent Variables: Where can I Find Measurement Scales?



SCALE NAME: Commitment to the Company (General)

SCALE DESCRIPTION:

The six item, seven-point Likert-type scale assesses the degree to which a person expresses a willingness to continue a relationship with a company and make some effort to do it if need be.

SCALE ORIGIN:

The scale appears to be original to Aaker, Fournier, and Brasel (2004) although they received inspiration from previous work by others.

RELIABILITY:

Aaker, Fournier, and Brasel (2004) reported alphas ranging from .91 to .93 over three time periods.

VALIDITY:

No examination of the scale's validity was reported by Aaker, Fournier, and Brasel (2004).

COMMENTS:

The company with which the scale was used in the experiment by Aaker, Fournier, and Brasel (2004) was a fictitious website. If the scale is used with other entities then adjustment in some of the items might be necessary, such as #3 (below).

REFERENCES:

Aaker, Jennifer, Susan Fournier, and S. Adam Brasel (2004). "When Good Brands Do Bad." *JCR*, 31 (June), 1-16.

SCALE ITEMS:¹

1. I am very loyal to _____.
2. I am willing to make small sacrifices in order to keep using _____.
3. I would be willing to postpone my purchases if the _____ site was temporarily unavailable.
4. I would stick with _____ even if it let me down once or twice.
5. I am so happy with _____ that I no longer feel the need to watch out for other alternatives.
6. I am likely to be using _____ one year from now.

¹ The name of the focal company should be placed in the blanks.



Accuracy of Measures

- Measures of theoretical concepts must be accurate
- **Problem:** Assessing the measures' accuracy is difficult as the concepts of interest are unobservable
- **Solution:** Consider different aspects that contribute to a measure's accuracy:

1. Objectivity

2. Reliability

3. Validity



4.1 Latent Variable Modeling

Accuracy of Measures: Reliability and Validity – “The True Score – Model”

$$X_{\text{observed}} = X_{\text{true}} + \varepsilon_{\text{random}} + \varepsilon_{\text{systematic}}$$

What we observe

The true score that we cannot observe directly

Error introduced by **random** variation

The **systematic** error

- **Reliability** is the degree to which measures are free from random error and therefore yield consistent results (i.e., $\varepsilon_{\text{random}} \approx 0$)
- **Validity** is the degree to which measures are free from systematic error (i.e., $\varepsilon_{\text{systematic}} \approx 0$)



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Stopwatch Exercise

Goal: measure 5 Time intervals of exactly 10 seconds with closed eyes.

Round	Time
5	00:08.35
4	00: 13.98
3	00: 10.62
2	00:08.46
1	00: 10.62



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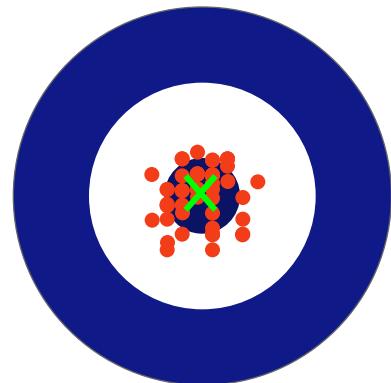
Round	Time	Round	Time	Round	Time
5	00:08.35	5	00:12.53	5	00:08.64
4	00:13.98	4	00:10.79	4	00:08.68
3	00:10.62	3	00:11.36	3	00:08.54
2	00:08.46	2	00:11.15	2	00:08.65
1	00:10.62	1	00:11.12	1	00:08.60



4.1 Latent Variable Modeling

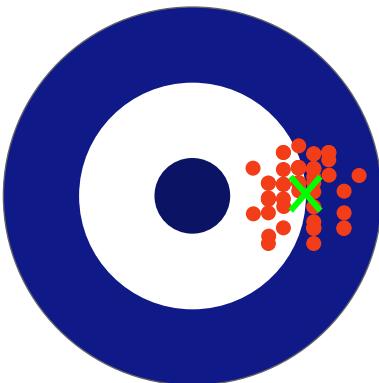
Accuracy of Measures: Scenarios for Measurement Outcomes

Valid and reliable
(negligible error)



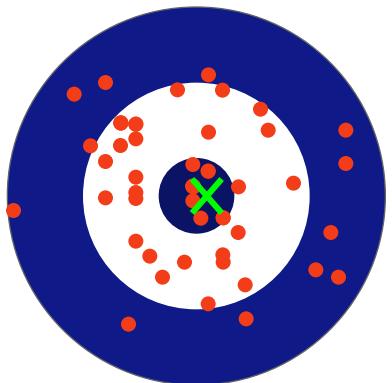
Team A

Reliable but invalid
(systematic error)



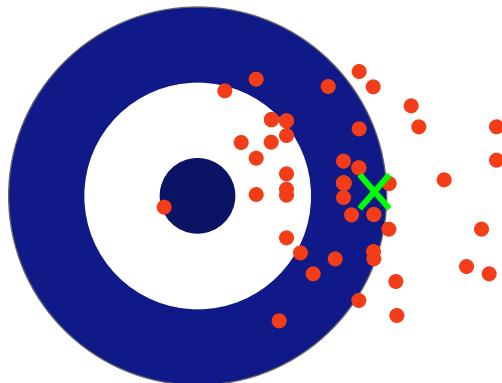
Team B

Not reliable and
invalid
(random error)



Team C

Invalid and not reliable
(random and systematic
error)



Team D

Reliability is a necessary condition for validity!



4.1 Latent Variable Modeling

Accuracy of Measures: Scenarios for Measurement Outcomes

Valid and reliable
(negligible error)



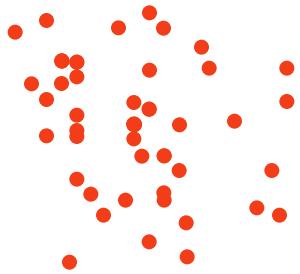
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Reliable but invalid
(systematic error)



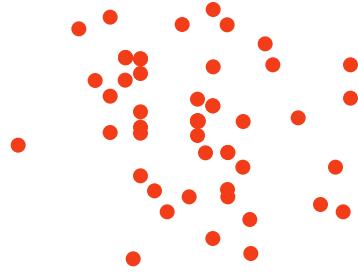
Team B

Not reliable and
invalid
(random error)



Team C

Invalid and not reliable
(random and systematic
error)



Team D



4.1 Latent Variable Modeling

Accuracy of Measures: Reliability Types (Examples)

1. Test-retest reliability

- Administer the same test to the same respondents on two different occasions.
- Correlation between two observations is the test-retest reliability.

2. Internal consistency reliability

- Concept: Conceive the indicators as different tests of the same theoretical concept – but at the same point in time. If the tests all measure the same concept, they should be highly correlated
- Types:
 - **Split-half reliability:** Randomly divide all items that purport to measure the same concept into two sets. The split-half reliability estimate is the correlation between the total score for each randomly divided half.
 - **Cronbach's alpha (Coefficient α):** Cronbach's alpha is mathematically equivalent to the average of all possible split-half estimates. It is the most frequently used estimate of internal consistency.
Guideline: Cronbach's alpha should be *above 0.7 but not (higher than) 0.95*; for newly developed scales, lower values of 0.6 are acceptable
 - **Composite reliability ρ_C and ρ_A**



4.1 Latent Variable Modeling

Accuracy of Measures: Validity Types (Examples)

Qualitative validity types

- **Content validity:** refers to the extent to which a measure represents all facets of a given construct
- **Face validity:** is the extent to which a test is subjectively viewed as covering the concept it purports to measure

Quantitative validity types

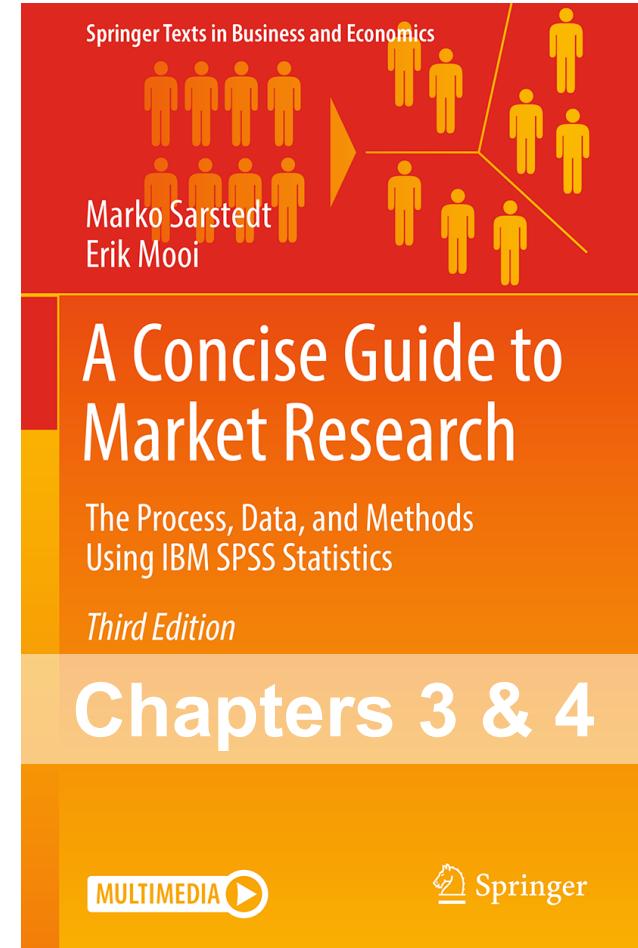
- **Convergent validity:** is the degree to which a construct explains the variance of its items
- **Discriminant validity:** ensures that a measure is empirically unique and represents phenomena of interest that other measures in a model do not capture
- **Nomological validity:** is the degree to which a construct behaves as it should in a system of related constructs.
- **Criterion validity:** measures how well one measure explains the outcome of another measure when both are measured at the *same time*.
- **Predictive validity:** is the extent to which an instrument predicts the outcome of another variable, measured at a *later point in time*.



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Today's Agenda

- Recap of last Week - Quiz
- Recap of Lecture
 - Measuring Constructs and
 - Measurement quality
- **Case Study - The Gnome Experiment:**





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Case Study: OgilvyOne Worldwide for Kern

The Gnome Experiment:

- World's first mass participation experiment showed that gravity varies from place to place and can affect weight
- Star of the experiment was a chip-proof garden gnome called Kern
- Gnome served to provide the campaign with a universally appealing personality

TED Talk: <https://www.youtube.com/watch?v=p0KTjcesecU> (6:52 min)



Task 1: Measurement Theory

How do we know whether a Kern scale's measurement is good?

For your answer consider

- a) the true score model (classical test theory),
- b) reliability,
- c) and validity.





Task 1: Measurement Theory

- ? How do we know whether a Kern scale's measurement is good? For your answer consider
- ??
 - a) the true score model (classical test theory),
 - b) reliability,
 - c) and validity.



The true score that we cannot observe directly

The systematic error

$$X_{\text{observed}} = X_{\text{true}} + \varepsilon_{\text{random}} + \varepsilon_{\text{systematic}}$$

What we observe

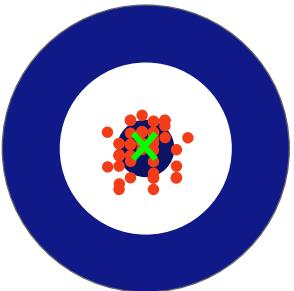
Error introduced by **random** variation



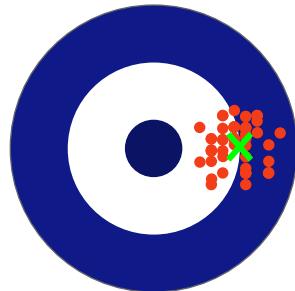
Task 1: Measurement Theory

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 - ❓ b) **reliability,**
 - ❓ c) **and validity.**

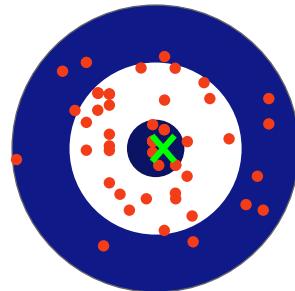
Valid and reliable
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