



Reliability and Validity

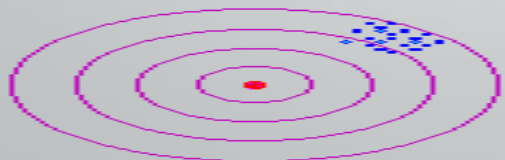
Dr. Mohammed Walid Zimmo

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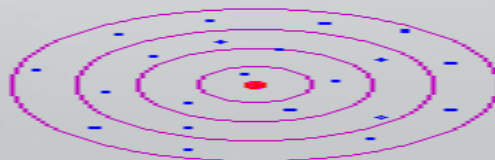
Al Azhar University

Introduction

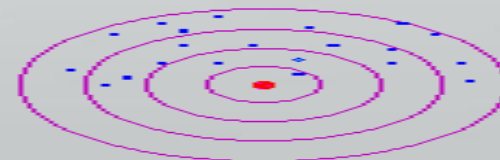
Reliability and validity as ways to demonstrate the rigour and trustworthiness of quantitative and qualitative research



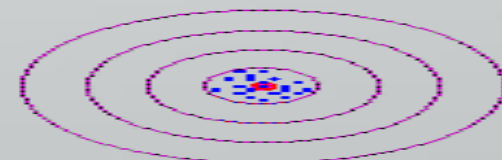
**Reliable
Not Valid**



**Valid
Not Reliable**



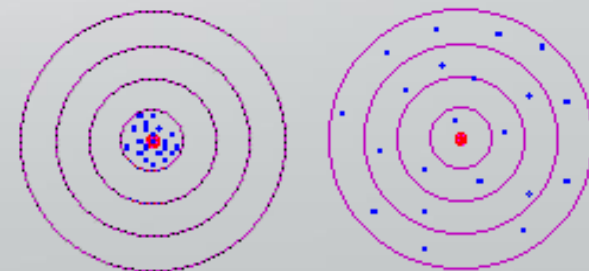
**Neither Reliable
Nor Valid**



**Both Reliable
And Valid**

Validity

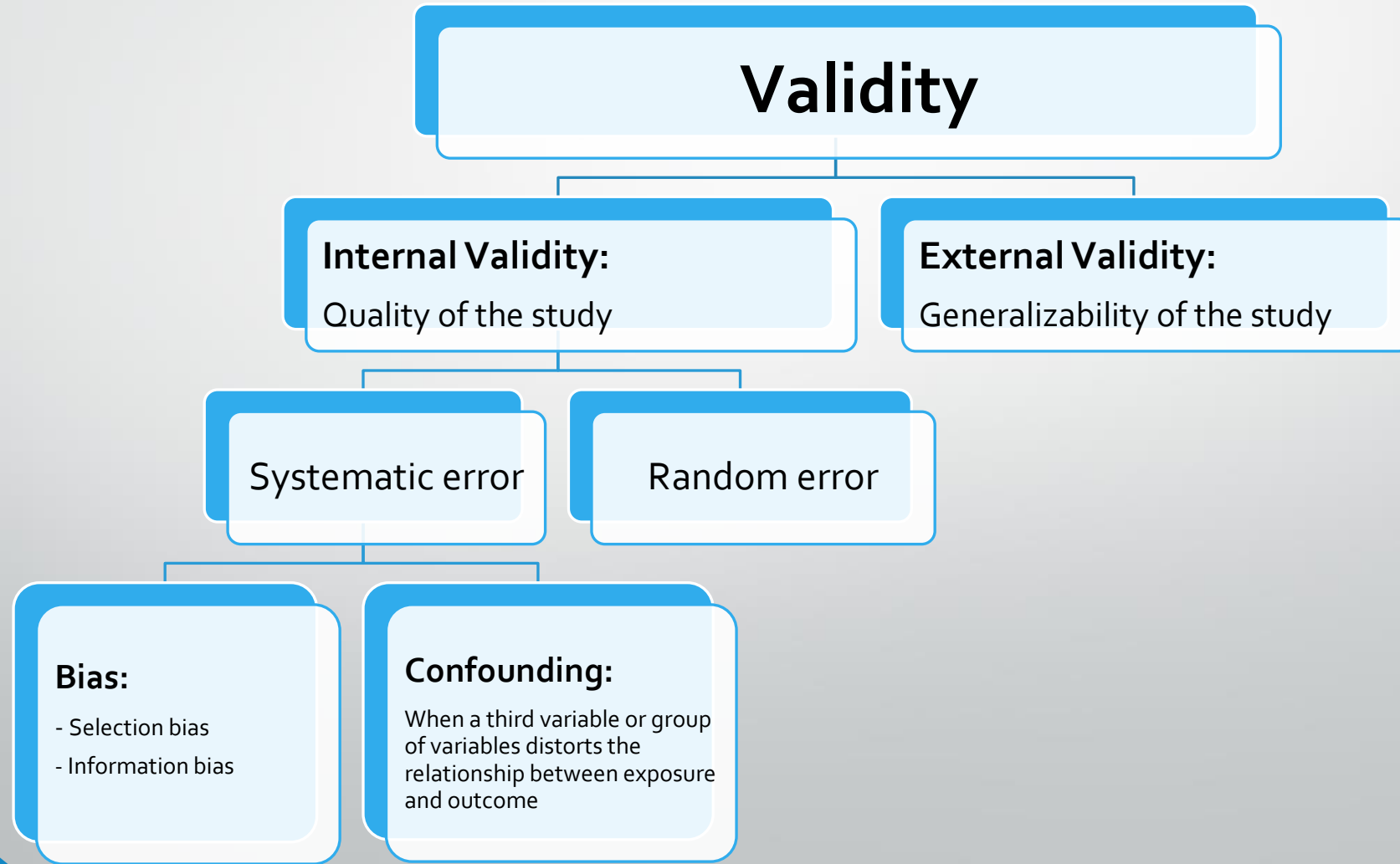
- Validity is how far we are accurate in our measurement
- Validity of a measure refers to the degree to which it actually measures what is designated to measure
- **Validity** can be divided into
 - Internal Validity
 - External Validity



Both Reliable
And Valid

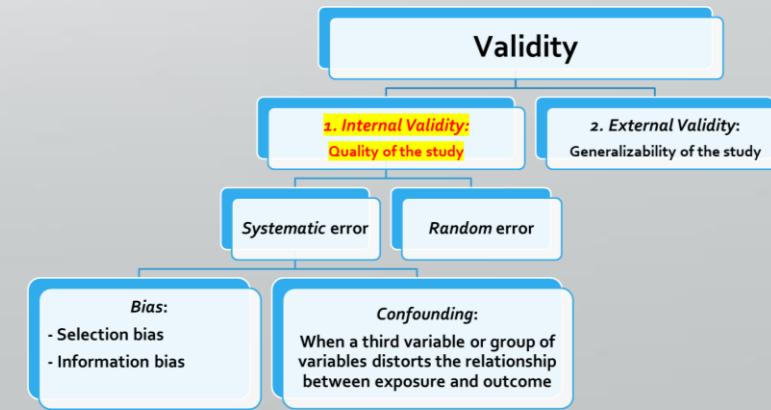
Valid
Not Reliable

Validity



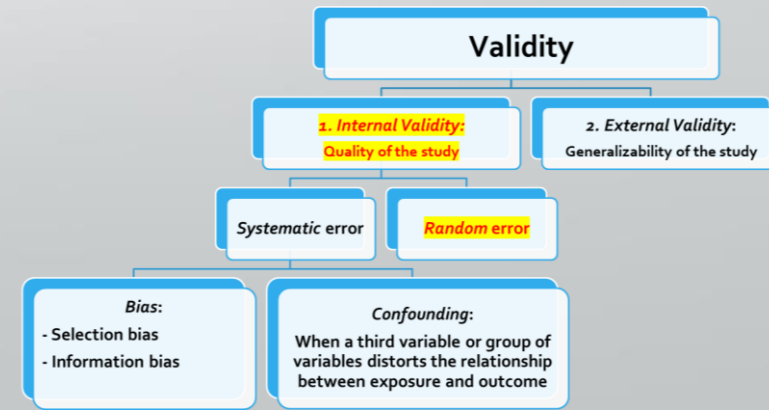
Internal validity

- The internal validity of a study reflects the **quality of the study**
- Random and systematic errors may affect internal validity



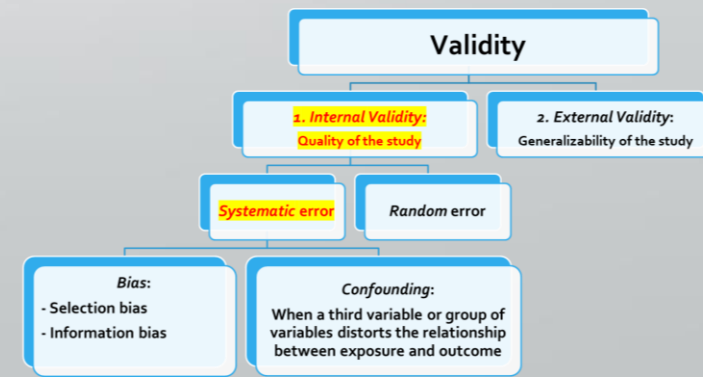
Random error

- Random error is a fluctuation in the data which is unavoidable in medical research and clinical practice



Systematic error

- Occurs when measurements record inaccurate values in one consistent direction due to blemish throughout the entire study
- Two main categories of systematic errors are
 1. Confounding
 2. Bias
- Bias can be divided into
 1. Information bias
 2. Selection bias



Systematic error

- **Confounding**

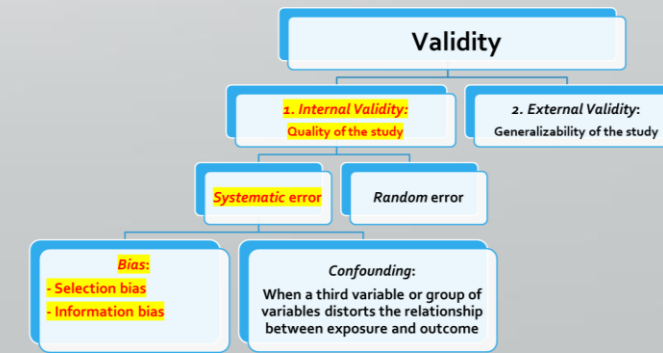
- Confounding factors are variables that are independently associated with both exposure and outcome without being the cause for the outcome
- Confounders can lead to misinterpretation of findings in observational studies
- It is essential to effectively manage possible confounding effects during the data collection process by the data analysis process with stratification or adjustment in multivariate analyses

Bias

1. Information bias

- Some degree of information bias is unavoidable in all studies; as **errors** due to
 - **Misclassification** of data
 - **Missing** data occur in most studies
- There are three types of information validity
 1. Face validity
 2. Content validity
 3. Construct validity

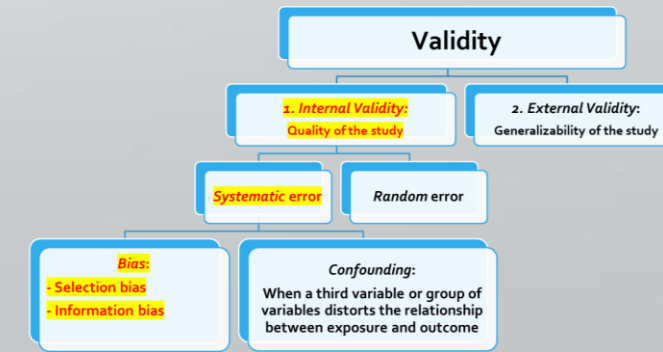
2. Selection bias



Information validity

1. Face validity

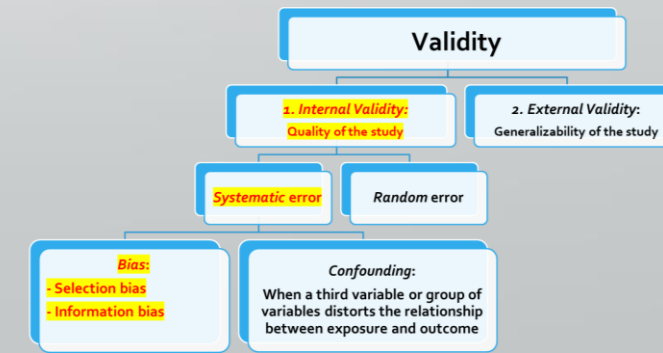
- The instrument should be clear **well** organized free from gaps that lead to mistakes in measuring the study variable
- The Questions should be well organized with enough spaces to answer
- Sequence of question should be logic and we have to avoid leading questions



Information validity

2. Content validity

- content validity is defined as the extent to which a test reflects the variables it seeks to measure
- This necessitates review of the variable measures; international recognized criteria for measurements are preferable
- it is advised that the investigator is given enough chance to construct his instrument
- Two methods are used to improve the content validity
 - Expert review
 - Pilot studies



Information validity

2. Construct validity

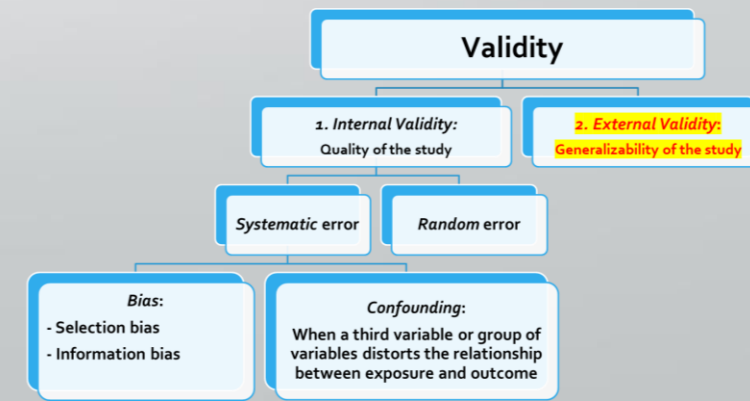
- This type of validity answers the question about the link between the conceptual definitions and the operational definitions of the variables and determines if the instrument actually measures the theoretical construct to be measured
- In the research process more than one item (factor) is used to measure the domain of interest
- The main difference between content validity and construct validity is the method by which we conduct validity measurement
 - **Content validity** depends mainly on subject estimate of the measurement based on personal judgment
 - **Construct validity** uses statistical testing such as factor analysis

External validity

- External validity or generalizability expresses the degree to which the study results can be extended to other situations or locations as well as to other study samples or the wider population
- **Threats to External Validity**

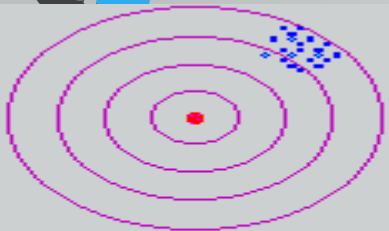
A threat to external validity is an explanation of how you might be wrong in making a generalization

1. People
2. Place
3. Time

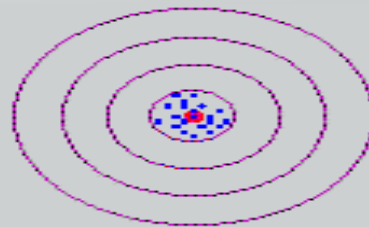


Reliability

- **Reliability of data** reflects the repeatability of findings and is negatively affected mainly by random errors or defects in the consistence and dependability of measurements of variables
- **Last defined Reliability as:** the degree of stability exhibited when a measurement is repeated under identical conditions
- **Lack of reliability** may arise from divergences between observed or instruments of measurement or instability of the attribute being measured



**Reliable
Not Valid**



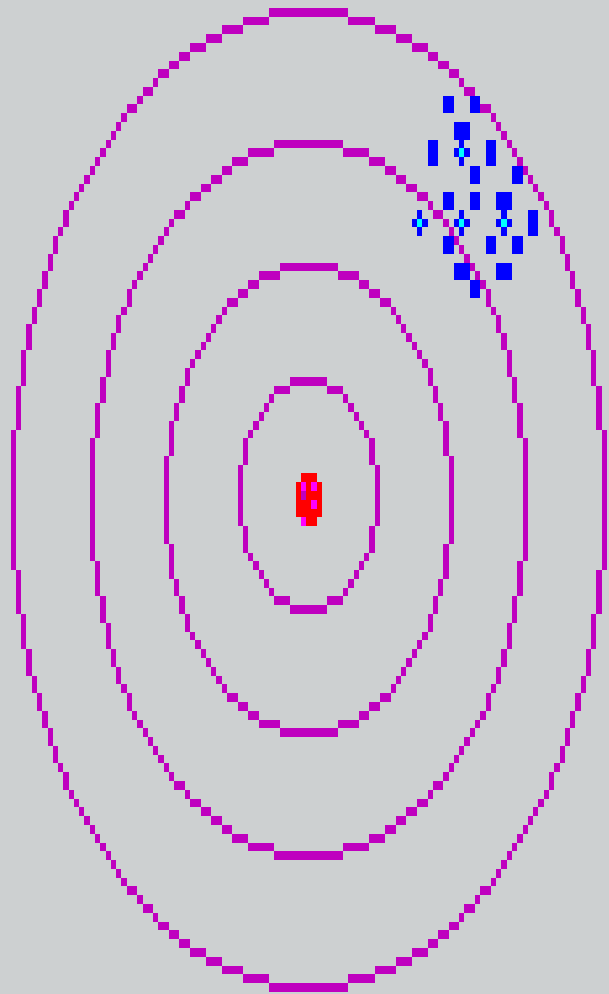
**Both Reliable
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Reliability

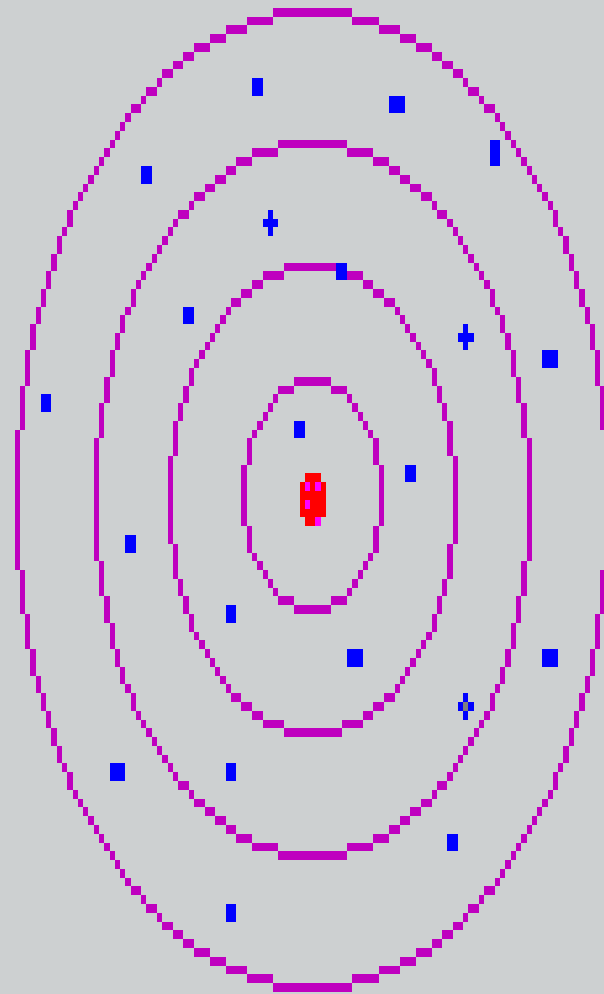
- **To improve Reliability**

We minimize inter-observer variations and intra-observer variations by:

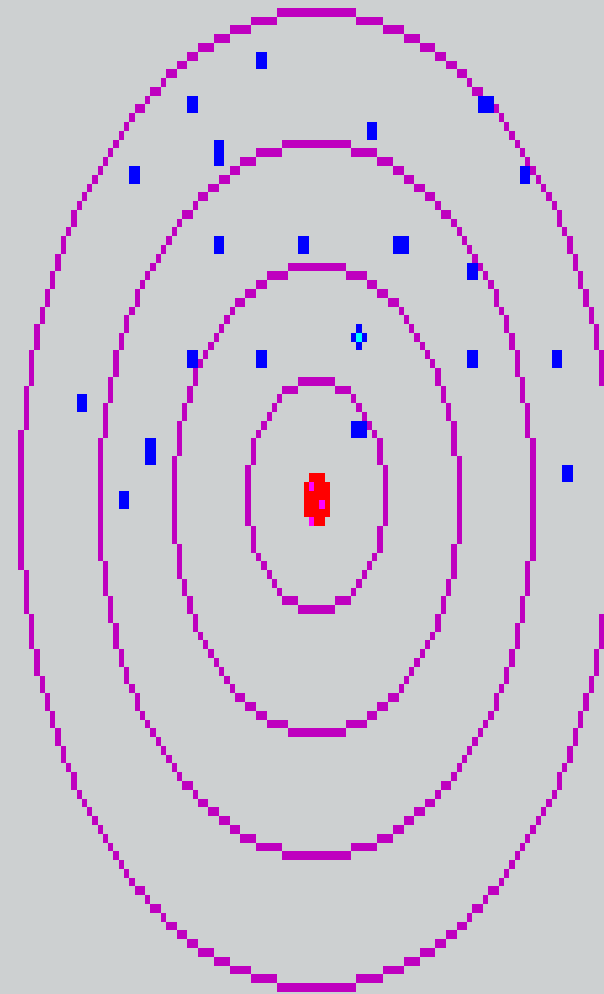
- Standardization of the procedures of the measurements
- Training of the observers



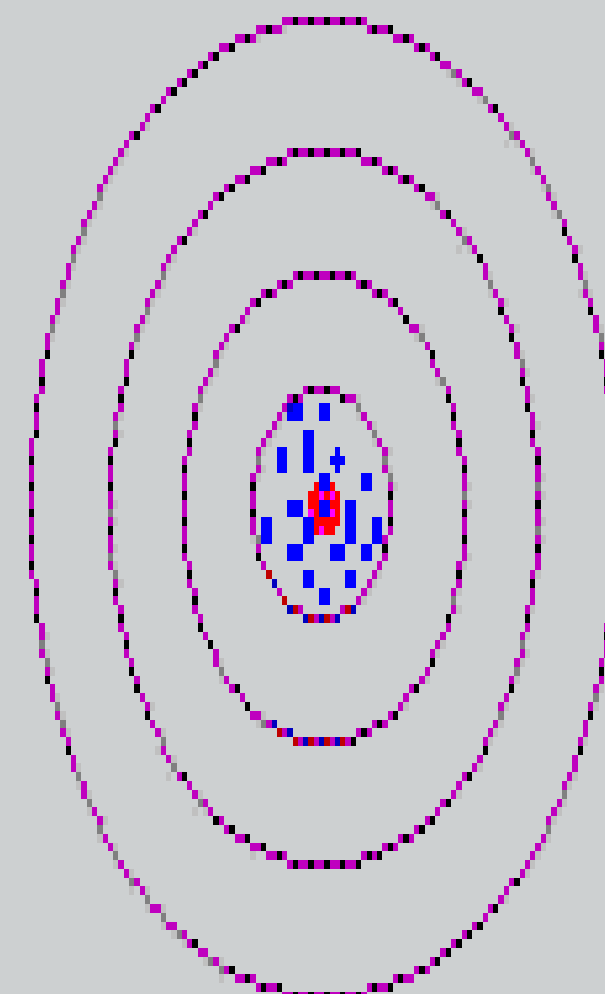
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THANK YOU