

How do the reinforcers relate to each other?

Qualitatively-varied reinforcement (QVR) is understood as the delivery of two or more different reinforcers for the same response (Steinman, 1968). The mixed results of studies using QVR makes it necessary to establish how the different reinforcers are related to each other.



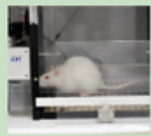
Two reinforcers can be related to each other in two ways:

- **Complementary:** If the consumption of one goes up, the consumption of the other goes up too, and the same if it goes down.
- **Substitutive:** If the consumption of one goes down, the consumption of the other goes up and vice versa. (Green & Freed, 1993)



Method

Subjects and apparatus



- 9 Male Wistar Han rats with previous experience with both food and water.



- Operant conditioning chamber
- 2 Nosepokes
- 2 Electrovalves
- 1 Feeder

Procedure

The conditioning chamber has an orifice on each side, when the rat inserted its nose into one of them it was counted as a response (Nosepoke). Each side is associated with a reinforcer.



Water



Food

Phases

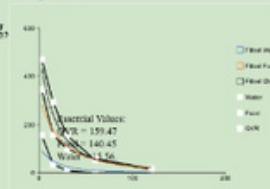
Throughout the different phases, the number of nosepokes needed to obtain each of these reinforcers (price/FR) was varied to establish the relationship between the two reinforcers.

	Price of water	Price of food
	FR 5	FR 5
	FR 2	FR 16
	FR 4	FR 8
	FR 1	FR 64

Discussion

- In a previous experiment, the essential value (Hursh & Silberberg, 2008) of a QVR, consisting of food and water, and of the two simple reinforcers alone, was calculated.
- It was expected that the essential value (EV) of QVR would be higher, but results of that experiment showed that there was no difference between the value of food alone as a reinforcer and that of the QVR (water and food) (see Figure 2).
- Although it has been generally assumed that food and water are complementary (Allison & Mack, 1982), results in this experiment point towards their relationship being closer to substitutability.
- Nevertheless, their relationship is not perfect substitutability as there is not a total cessation of food intake on a consistent basis.
- Experimental limitations, such as running five successive days and then a two-day break, could explain anomalous data that deviate from the trend. Peak responses can be observed in several subjects on the first session after the two-day break.
- The lack of complementarity can be an interesting lead to explain why QVR does not have a greater EV than food and water alone. In a QVR schedule, rats would be receiving a highly valuable reinforcer (food) intercalated with a less valuable substitute (water), rather than two equally-valued reinforcers.
- The evaluation of the relationship between reinforcers being used in QVR schedules should be performed, in order to explore if that might explain the mixed results in the literature.

Figure 2



Results

The colored bar at the top of each graph represents the price change over the sessions. The colors correspond to those indicated in the table in the method section.

— Ref Water — Ref Food

Figure 1. Each graph represents the data for one subject across sessions. Indicating the number of reinforcers of each type obtained per session.