



## RELATION COMPOSITES

### Why

If  $x$  is related to  $y$  and  $y$  to  $z$ , then  $x$  and  $z$  are related.

### Definition

Let  $R$  be a relation from  $X$  to  $Y$  and  $S$  a relation from  $Y$  to  $Z$ . The *composite relation* from  $X$  to  $Z$  contains the pair  $(x, z) \in (X \times Z)$  if and only if there exists a  $y \in Y$  such that  $(x, y) \in R$  and  $(y, z) \in S$ . This composite relation is sometimes called the *relative product*.

### Notation

We denote the composite relation of  $R$  and  $S$  by  $R \circ S$  or  $RS$ .

### Example

Let  $X$  be the set of people and let  $R$  be the relation in  $X$  “is a brother of” and  $S$  be the relation in  $X$  “is a father of”. Then  $RS$  is the relation “is an uncle of”.

### Properties

Composition of relation is associative but not commutative.<sup>1</sup>

---

<sup>1</sup>A fuller account will appear in future editions.



