$-1 \times -1 = 1$?

What is this strange language?

This activity follows on from an article that appeared in the Mathematics Teaching journal from the Association of Teachers of Mathematics: http://www.atm.org.uk

Let's try -2×-2

Write some numbers on a set of cards: -2, -2, 3, 4 and 5
Give duplicate sets to two pupils, Jack and Jill.
They lay out the cards in front of them on the table.
Ask each one for their total (8).

To Jack, say "I am going to take away two lots of the –2 card".

Remove two –2 cards and write down:

Jack
-2×-2

Ask for Jack's new total (12).

To Jill, say "I am going to give you 4" (another card).

Give Jill a 4 card and write down:

Jack	Jill
-2×-2	4

Ask for Jill's new total (12).

Ask Jack and Jill if they agree that subtracting two –2's had an equal effect to adding 4. If they agree, write the = sign:

Jack		Jill
-2×-2	=	4

Job done, but you might prefer to write…

-2 –2 +3 +4 +5	-2 (-2)	= 12	Jack's cards
-2 –2 +3 +4 +5	+4	= 12	Jill's cards

What else might you do with these cards?

Well, you could be the bank with a third set of duplicate cards. At the end you would have gained two –2's and given away a 4 card. You would be eight worse off…

-2 -2 +3 +4 +5	= 8	at the start
-2 -2 +3 +4 +5 +2(-2)	= 4	Jack to bank
-2 -2 +3 +4 +5 +2(-2) –4	= 0	bank to Jill

To the bank's pile we added Jack's two -2 cards and then subtracted a 4 card and give it to Jill. The bank is eight worse off. Adding two –2's had the same effect as –4.

Lessons?
To explain "–1 x –1 = 1" is difficult if we lose contact with what is concrete. Words and symbols throw up too many opportunities for visual learners like me to fly off at a tangent.

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Some mathematical models: http://www.easypeasy.co.uk