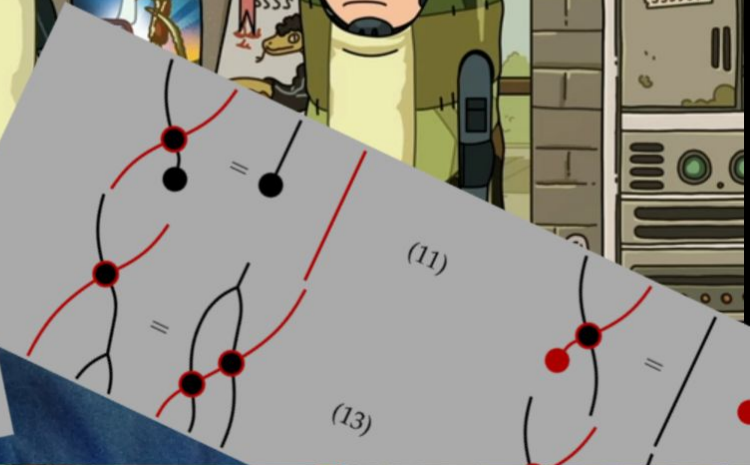
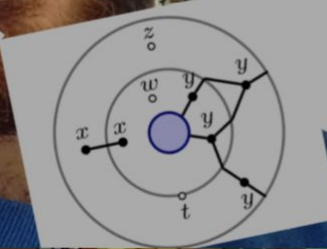
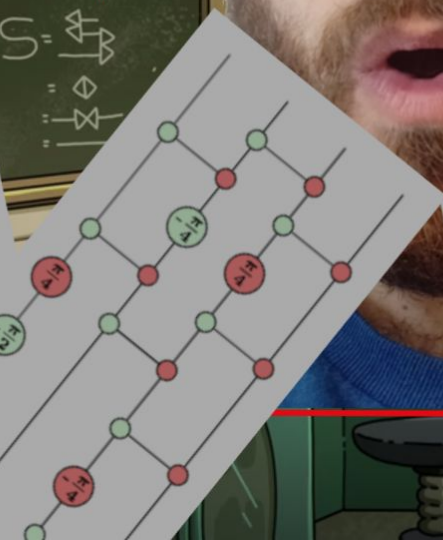
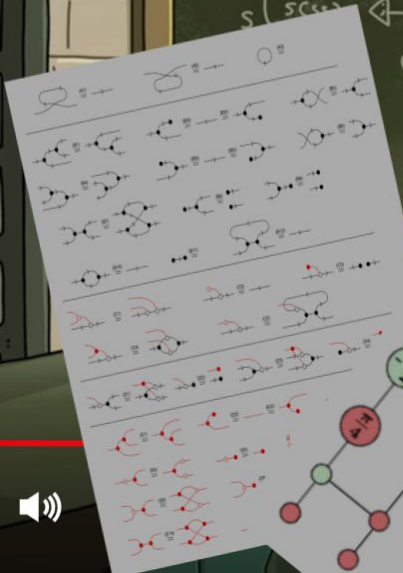


Handwritten mathematical expressions on a chalkboard:

$$S \left\{ \begin{array}{l} S \\ S \end{array} \right. \frac{S}{S} \Delta = - \Delta \Delta \left[\right]$$
$$S = \Delta \Delta$$
$$= \Delta \Delta$$



Abstraction





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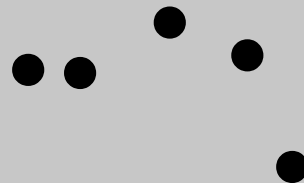
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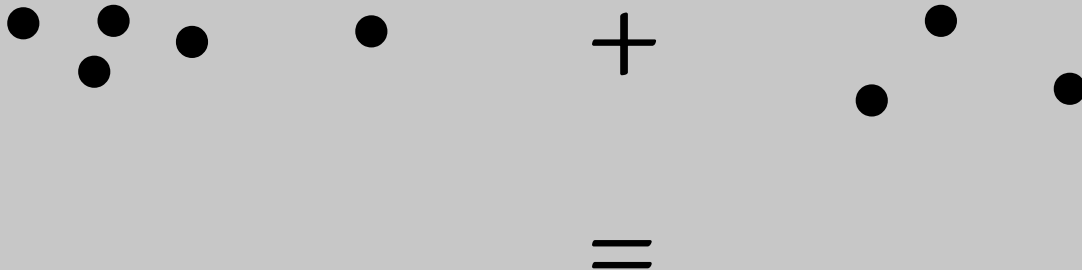
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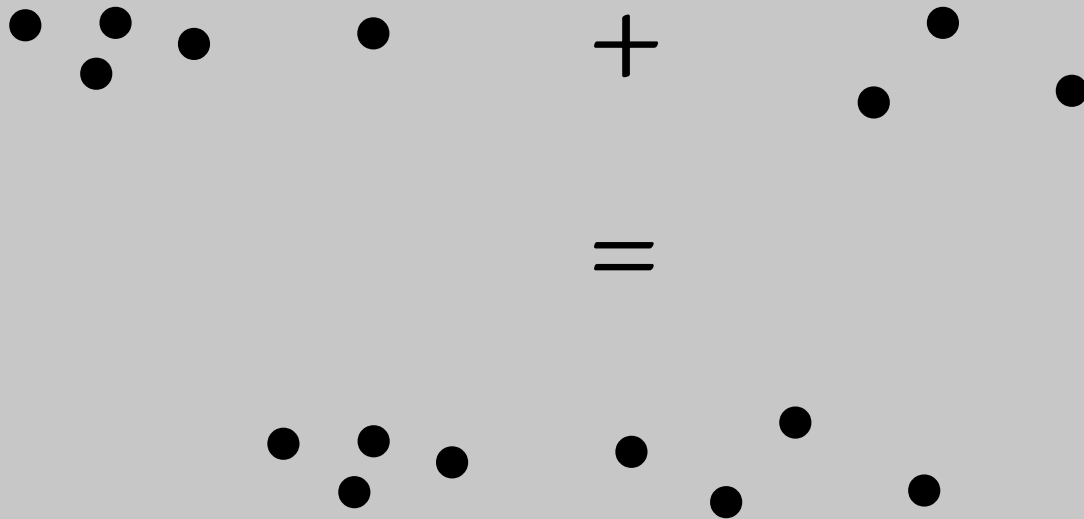


Addition

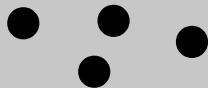


A visual representation of the addition $4 + 3 = 7$. The equation is shown using black dots and mathematical symbols on a light gray background. On the left, there are four dots arranged in a horizontal line. To their right is a plus sign $+$. Further right are three dots arranged in a triangular pattern (one at the top, two below it). To the right of these dots is an equals sign $=$. Finally, on the far right, there are seven dots arranged in a horizontal line.

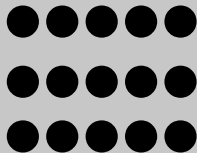
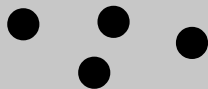
Addition



Multiplication



Multiplication



Rimes

Rimes

C'est l'histoire de Loulou Lapierre
Une p'tite mère ben ordinaire
Qui travaille à temps partiel
Comme femme de chambre dans un hôtel

Joyeux calvaire! - Les Cowboys Fringants

Rimes

C'est l'histoire de Loulou Lapierre
Une p'tite mère ben ordinaire
Qui travaille à temps partiel
Comme femme de chambre dans un hôtel

A
A
B
B

Joyeux calvaire! - Les Cowboys Fringants


Rimes

C'est l'histoire de Loulou Lapierre Une p'tite mère ben ordinaire Qui travaille à temps partiel Comme femme de chambre dans un hôtel	A A B B	
Joyeux calvaire! - Les Cowboys Fringants		
ولا في بهالجب مصاري ولا ممكن فيه ليرات ولا ممكن في اراضي ولا فيه مجوهرات	A B A B	
Ziad Rahbani - بلا ولا شي		

Rimes

C'est l'histoire de Loulou Lapierre Une p'tite mère ben ordinaire Qui travaille à temps partiel Comme femme de chambre dans un hôtel	A A B B	
Joyeux calvaire! - Les Cowboys Fringants		
ولا في بهالجب مصاري ولا ممكن فيه ليرات ولا ممكن في اراضي ولا فيه مجوهرات	A B A B	
Ziad Rahbani - بلا ولا شي		
There's something in this sound that takes me far It's like a special song Can move my mood along But I cannot say you'll hear through my guitar	A B B A	
It Runs Through Me - Tom Misch		


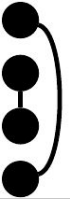
Rimes

C'est l'histoire de Loulou Lapierre Une p'tite mère ben ordinaire Qui travaille à temps partiel Comme femme de chambre dans un hôtel	A A B B	
Joyeux calvaire! - Les Cowboys Fringants		
ولا في بهالجب مصاري ولا ممكن فيه ليرات ولا ممكن في اراضي ولا فيه مجوهرات	A B A B	
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C'est l'histoire de Loulou Lapierre Une p'tite mère ben ordinaire Qui travaille à temps partiel Comme femme de chambre dans un hôtel	A A B B	
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Ziad Rahbani - بلا ولا شي		
There's something in this sound that takes me far It's like a special song Can move my mood along But I cannot say you'll hear through my guitar	A B B A	
It Runs Through Me - Tom Misch		

Une petite histoire

TW: maths!

Théorème: Une loi distributive entre deux monades induit une structure de monade composée.

Théorème: Une loi distributive entre deux monades induit une structure de monade composée.

$$(\hat{\mu} \diamond \mu) \circ \hat{M}\lambda M \circ \overline{M}(\hat{\eta} \diamond \eta) = \mathbb{1}_{\overline{M}}$$

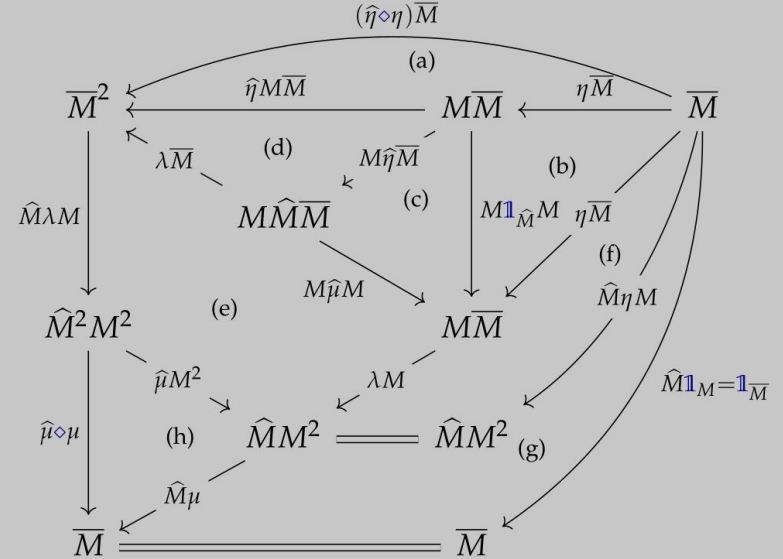
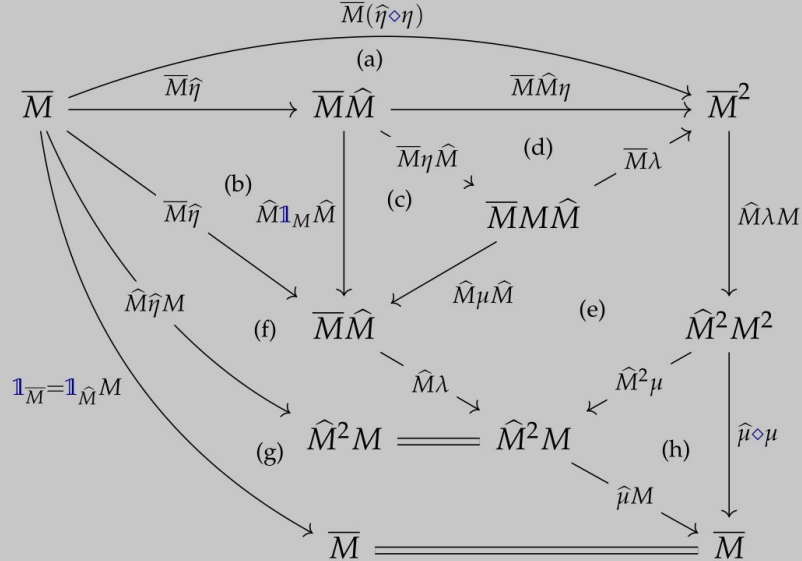
$$(\hat{\mu} \diamond \mu) \circ \hat{M}\lambda M \circ (\hat{\eta} \diamond \eta)\overline{M} = \mathbb{1}_{\overline{M}}$$

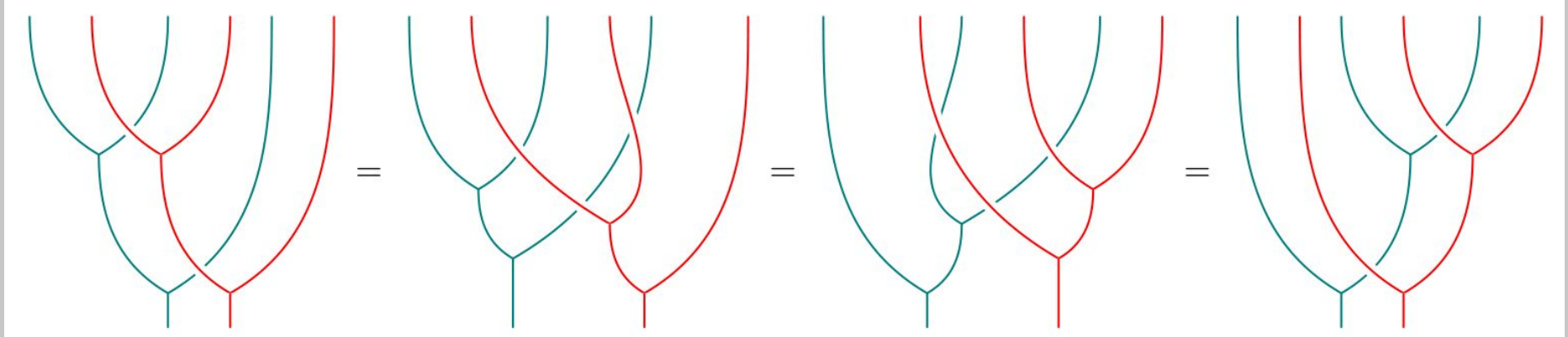
$$(\hat{\mu} \diamond \mu) \circ \hat{M}\lambda M \circ (\hat{\mu} \diamond \mu)\overline{M} \circ \hat{M}\lambda M\overline{M} = (\hat{\mu} \diamond \mu) \circ \hat{M}\lambda M \circ \overline{M}(\hat{\mu} \diamond \mu) \circ \overline{M}\hat{M}\lambda M$$

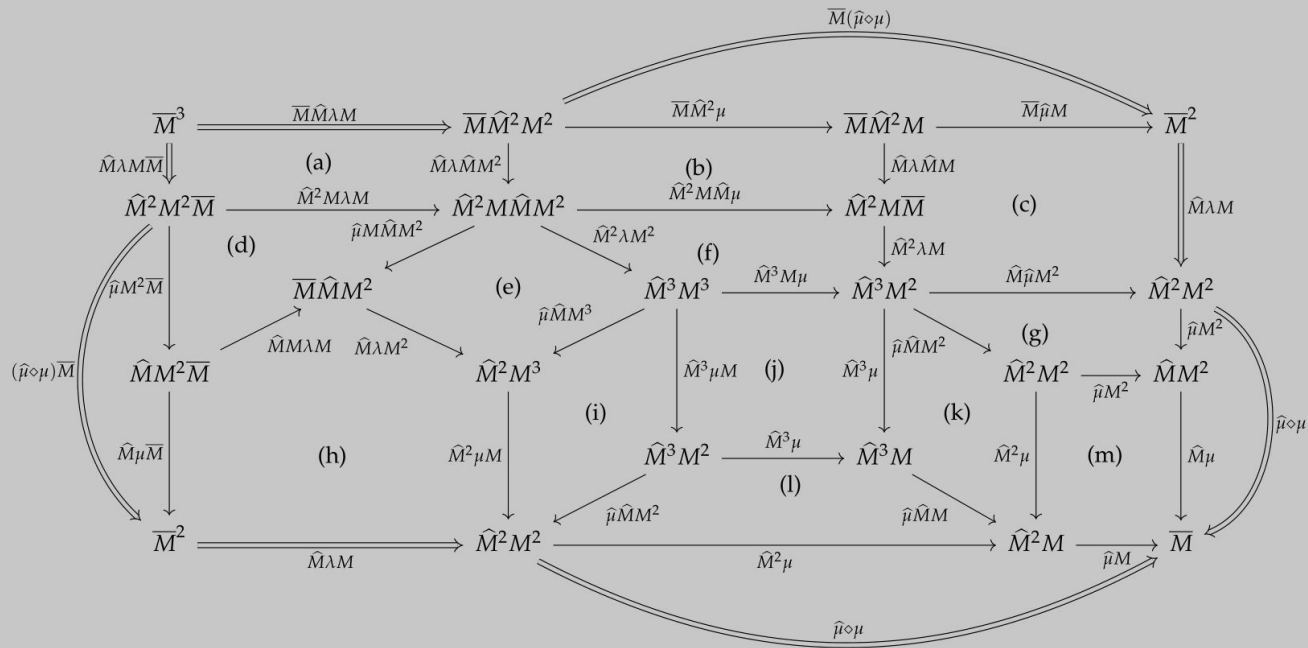
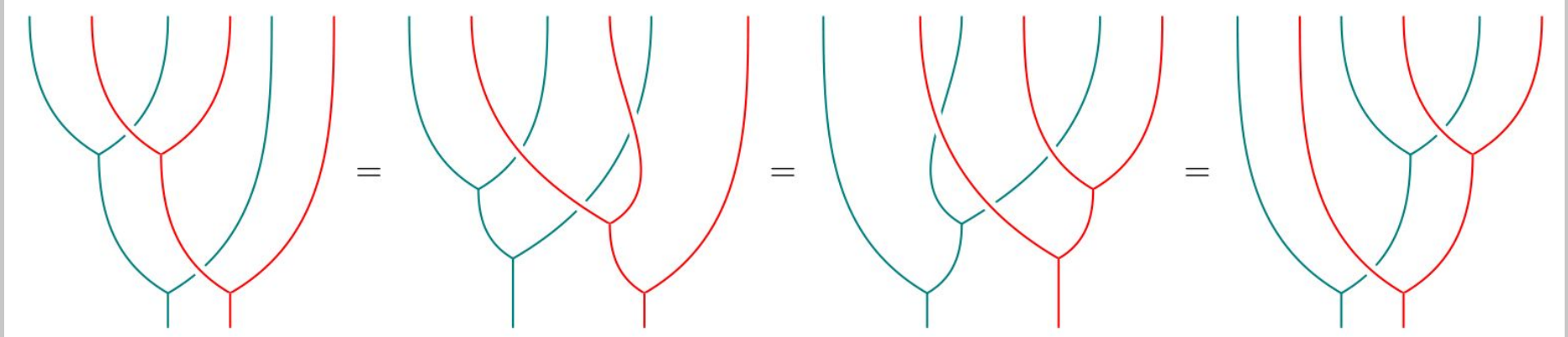
Théorème: Une loi distributive entre deux monades induit une structure de monade composée.

$$(\hat{\mu} \diamond \mu) \circ \hat{M}\lambda M \circ \overline{M}(\hat{\eta} \diamond \eta) = \mathbb{1}_{\overline{M}}$$

$$(\hat{\mu} \diamond \mu) \circ \hat{M}\lambda M \circ (\hat{\eta} \diamond \eta)\overline{M} = \mathbb{1}_{\overline{M}}$$



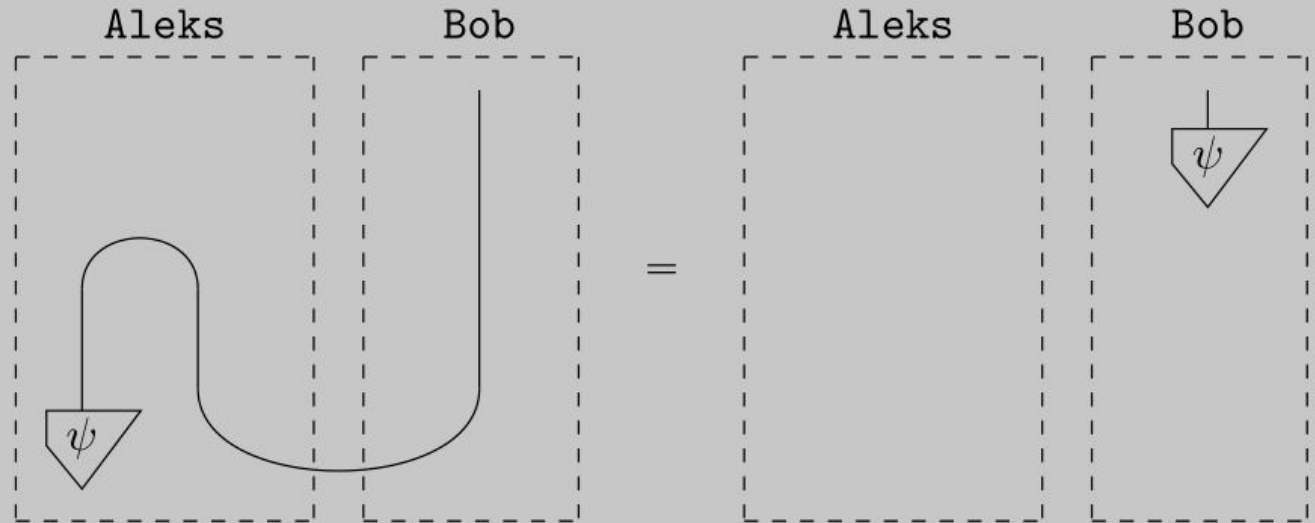
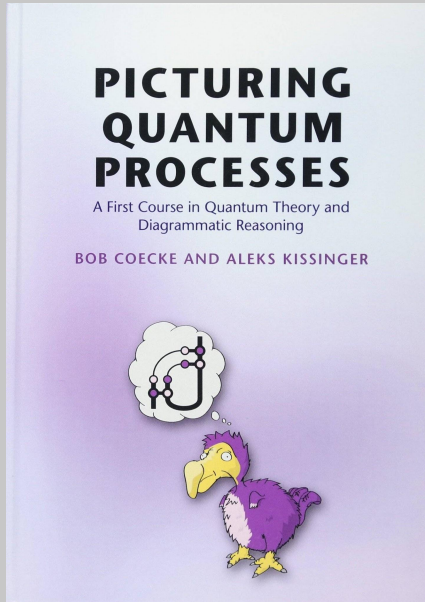




Examples

Procédés Quantiques

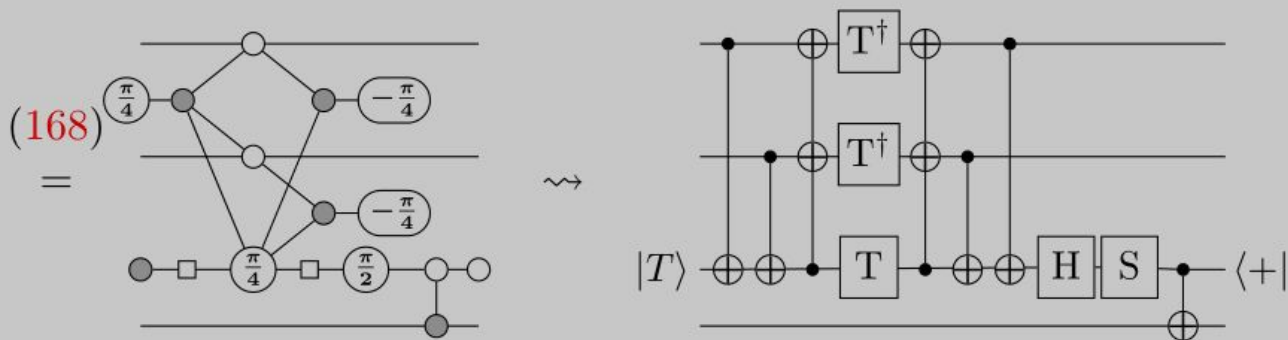
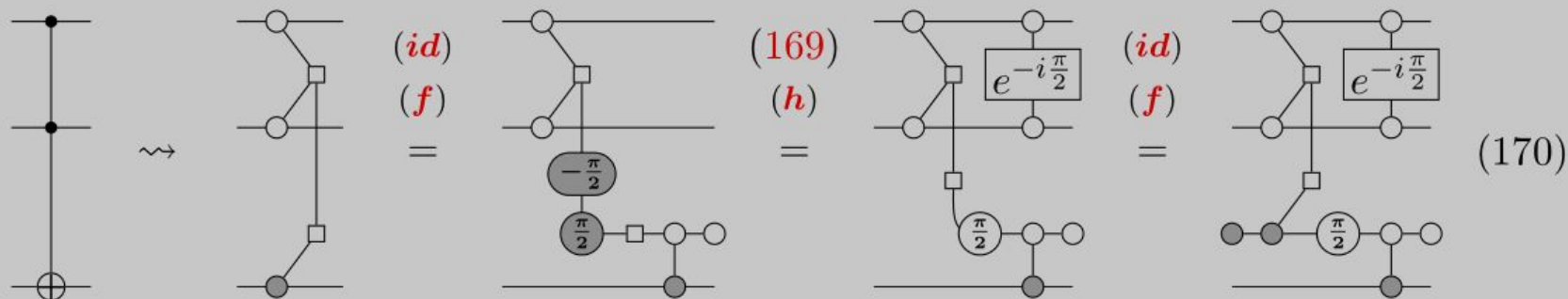
Quantum Teleportation



Liens: [article](#), [bouquin](#), [NLP quantique](#), [blog](#)

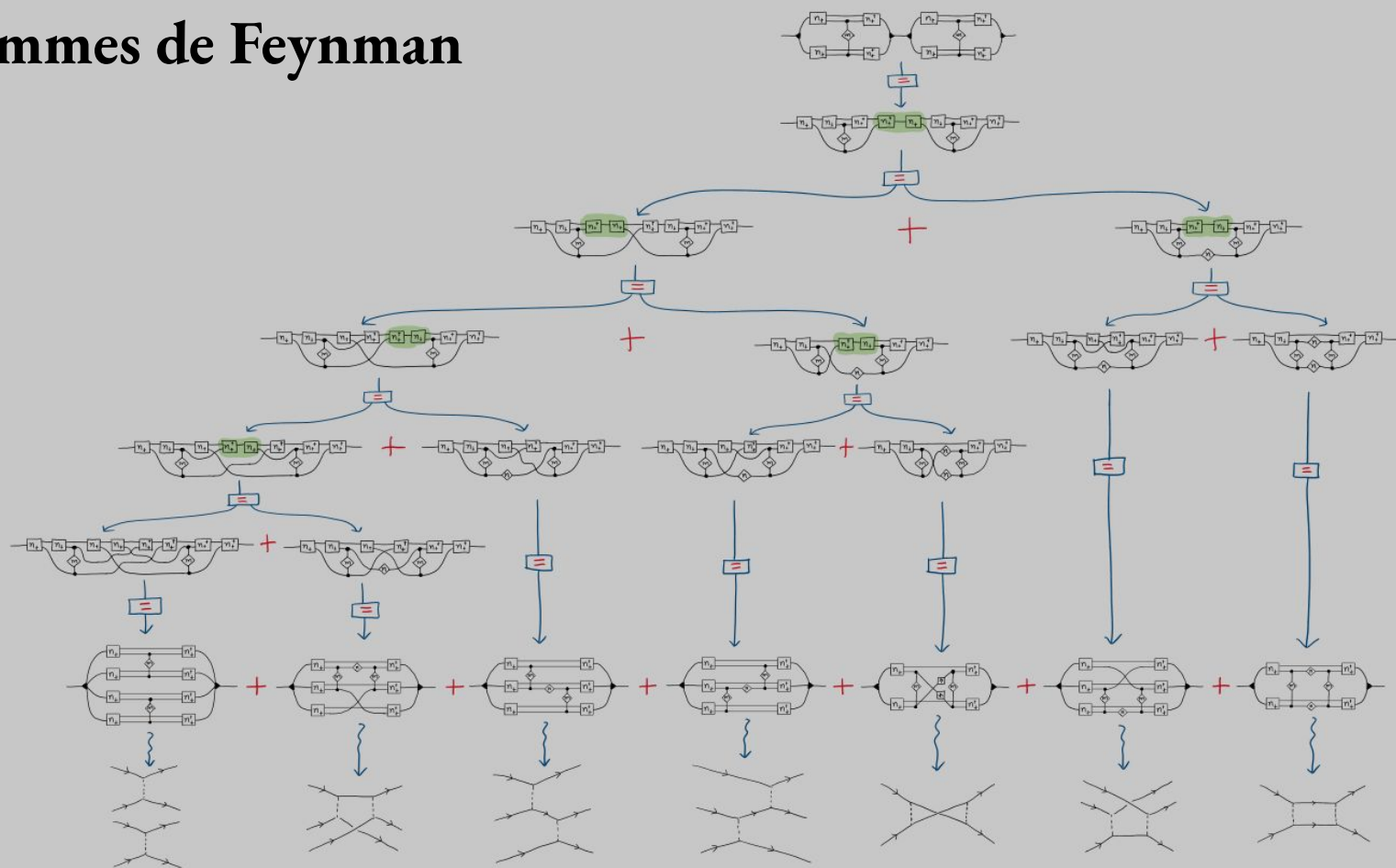
Circuits Quantiques

We can now rewrite the Toffoli gate to a more efficient construction:



Liens: [article](#), [communauté](#), [implémentation Julia](#), [implémentation Python](#)

Diagrammes de Feynman



Liens: [article](#)

Figure 1. Composition of categorical Feynman diagrams, cf. Section 4.4.

Théorie des Jeux

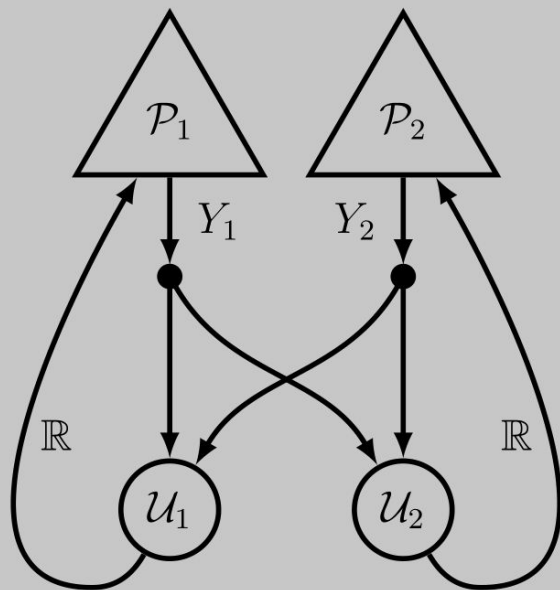


Figure 26: Bimatrix Game

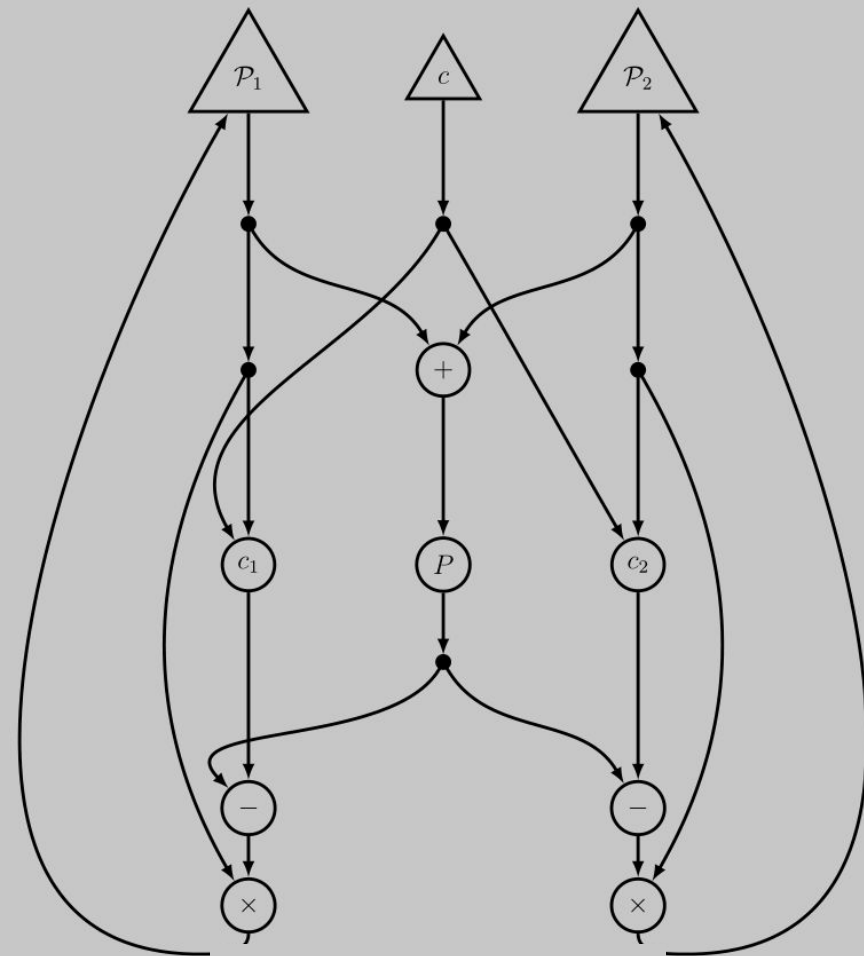


Figure 30: Cournot Duopoly

Liens: [article](#), [article \(jeux sur des graphes\)](#)

Automates

$$\begin{aligned}
 \langle e + f \rangle &= \text{Diagram 1} \stackrel{(C4)}{=}_{KAA} \text{Diagram 2} & \langle 0 \rangle &= \text{Diagram 3} \stackrel{(C3)}{=}_{KAA} \text{Diagram 4} \\
 \langle ef \rangle &= \text{Diagram 5} \stackrel{(C1)}{=}_{KAA} \text{Diagram 6} & \langle 1 \rangle &= \text{Diagram 7} \stackrel{(C2)}{=}_{KAA} \text{Diagram 8} \\
 \langle e^* \rangle &= \text{Diagram 9} \stackrel{(C5)}{=}_{KAA} \text{Diagram 10} & \langle a \rangle &= \text{Diagram 11} =: \text{Diagram 12} \quad (8)
 \end{aligned}$$

Diagram 1: A horizontal line with a circle. Two red boxes labeled 'e' and 'f' are above the circle, with red lines connecting them to the circle.

Diagram 2: A horizontal line with two black dots. Between them are two boxes labeled 'e' and 'f' stacked vertically.

Diagram 3: A horizontal line with a circle. A red dot is above the circle, with a red line connecting it to the circle.

Diagram 4: A horizontal line with two black dots.

Diagram 5: A horizontal line with a circle. Two red boxes labeled 'e' and 'f' are above the circle, with red lines connecting them to the circle.

Diagram 6: A horizontal line with two black dots. Between them are two boxes labeled 'e' and 'f' stacked vertically.

Diagram 7: A horizontal line with a circle. A red circle is above the circle, with a red line connecting it to the circle.

Diagram 8: A horizontal line with two black dots.

Diagram 9: A horizontal line with a circle. A red box labeled 'e' is above the circle, with a red line connecting it to the circle.

Diagram 10: A horizontal line with two black dots. Between them is a box labeled 'e'. There are loops and connections between the dots and the box.

Diagram 11: A horizontal line with a circle. A red box labeled 'a' is above the circle, with a red line connecting it to the circle.

Diagram 12: A horizontal line with a box labeled 'a'.

For example, $\langle ab(a + ab)^* \rangle =$

$$\text{Diagram 13} \stackrel{=}{=}_{KAA} \text{Diagram 14} \quad (9)$$

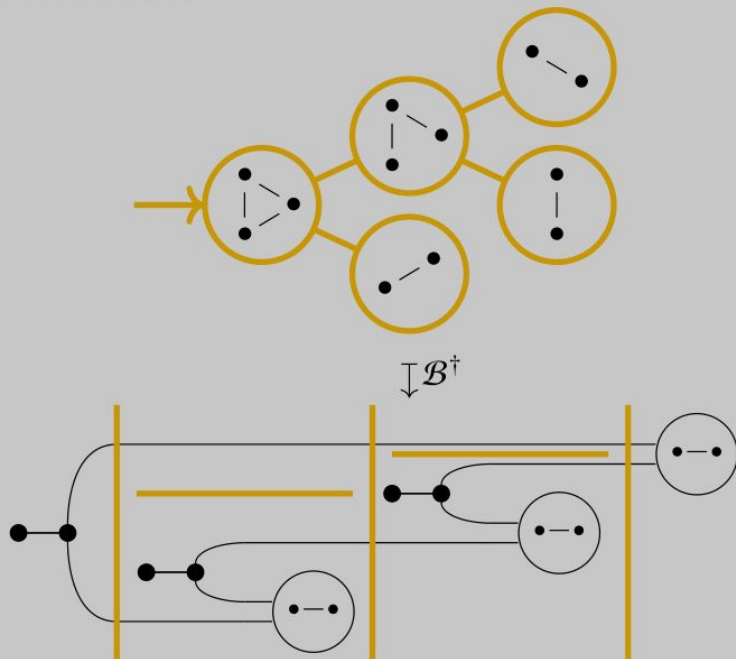
Diagram 13: A horizontal line with a circle. Two red boxes labeled 'a' and 'b' are above the circle, with red lines connecting them to the circle. There are also red lines connecting the boxes to each other.

Diagram 14: A horizontal line with two black dots. Between them are two boxes labeled 'a' and 'b' stacked vertically. There are loops and connections between the dots and the boxes.

Liens: [article](#), [article \(automates probabilistes\)](#)

Monoidal Width

Example 5.16. *The 3-clique has a branch decomposition as shown on the top. The corresponding monoidal decomposition is shown below it.*



Théorèmes

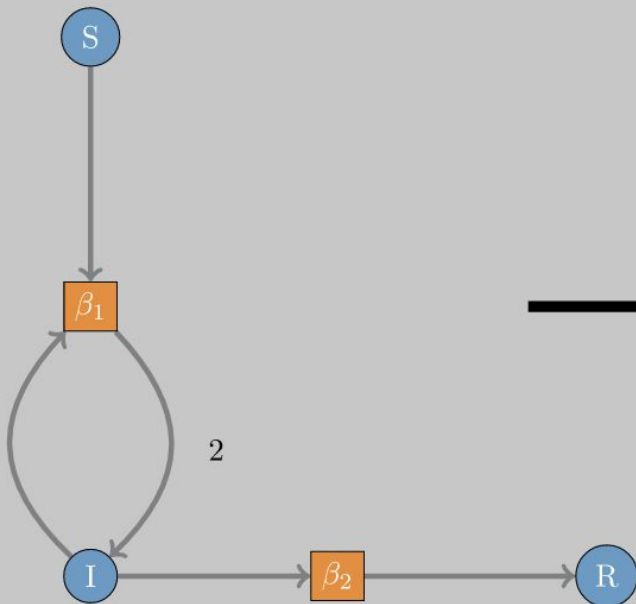
$$\begin{aligned} \text{twd}(G) &\leq \text{mtwd}(g) \leq 2 \cdot \text{twd}(G) \\ \frac{1}{2} \cdot \text{bwd}(G) &\leq \text{mwd}(g) \leq \text{bwd}(G) + 1 \\ \text{pwd}(G) &= \text{mpwd}(g) \end{aligned}$$

Liens: [article](#)

Modélisation Scientifique

Petri

Dynam



F

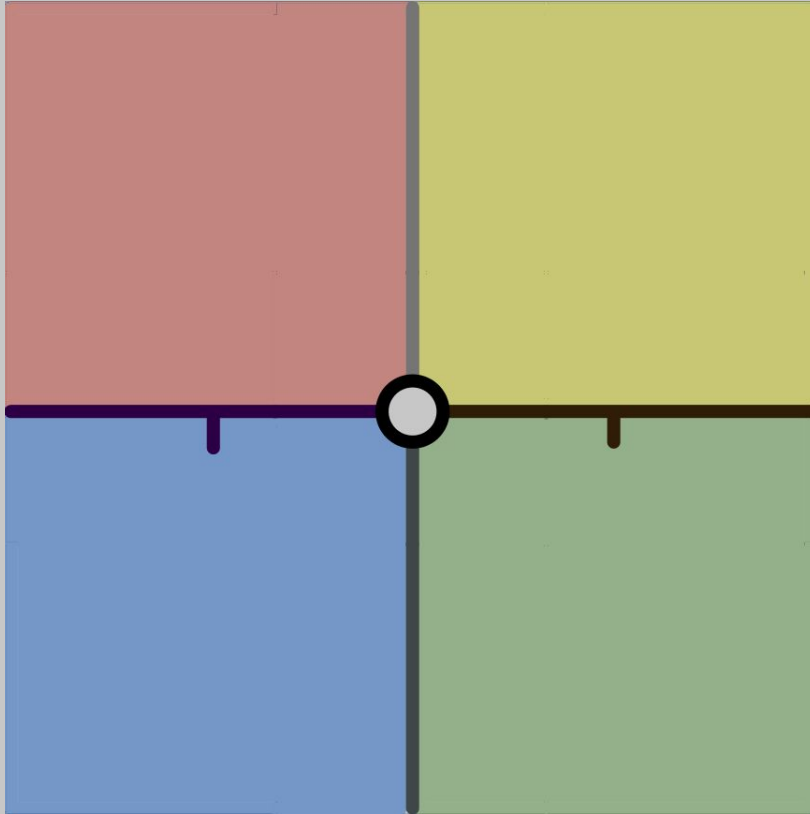
$$\dot{S} = \beta_1 SI$$

$$\dot{I} = \beta_1 SI - \beta_2 I$$

$$\dot{R} = \beta_2 I$$

Liens: [article](#), [blogpost](#), [AlgebraicJulia](#)

Logique en Couleurs



$$\frac{a \text{ R } b}{f(a) \text{ S } g(b)}$$

Liens: [présentation vidéo](#), [article](#), [thésard](#)

Merci !