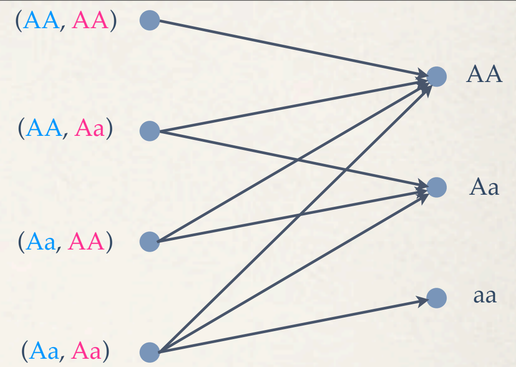
Genotype probabilities in the filial generation



Parental pairing	P(♂,♀)
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P(· | ♂,♀)	AA	Aa	aa
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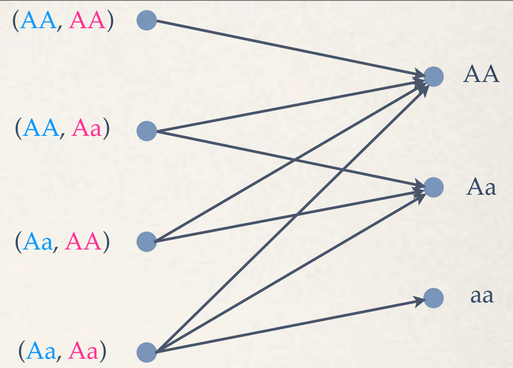

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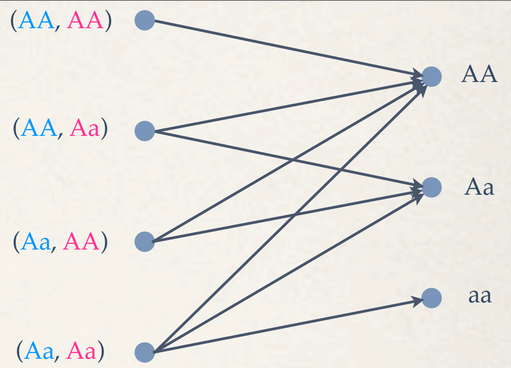

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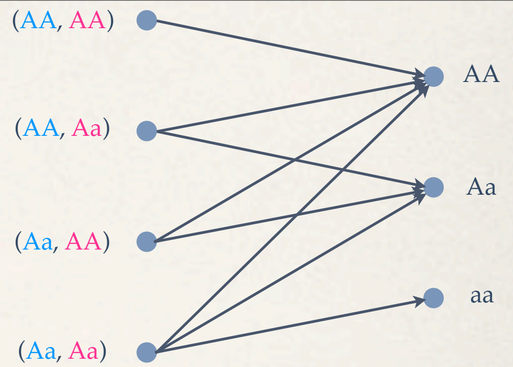

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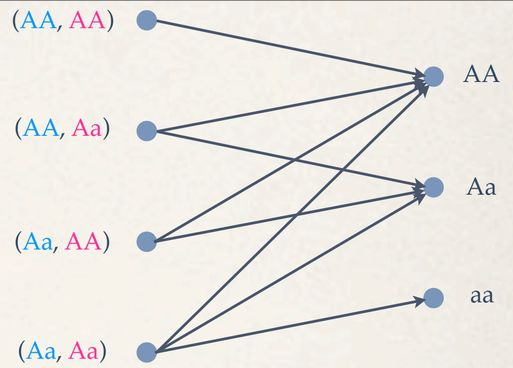
Genotype probabilities in the filial generation



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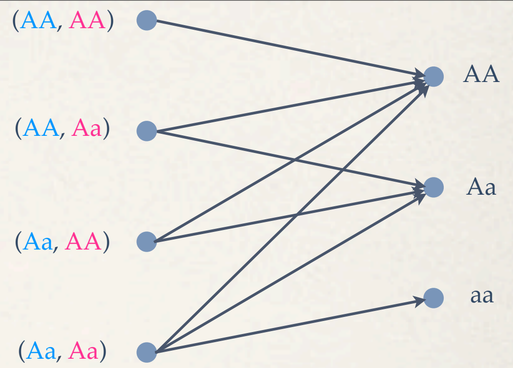
Genotype probabilities in the filial generation



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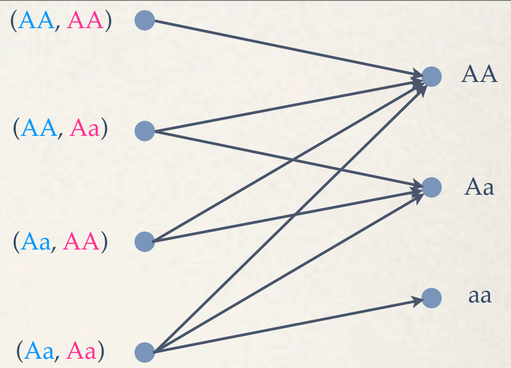
Genotype probabilities in the filial generation



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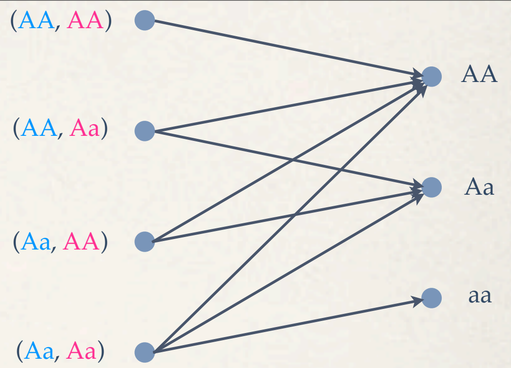
Genotype probabilities in the filial generation



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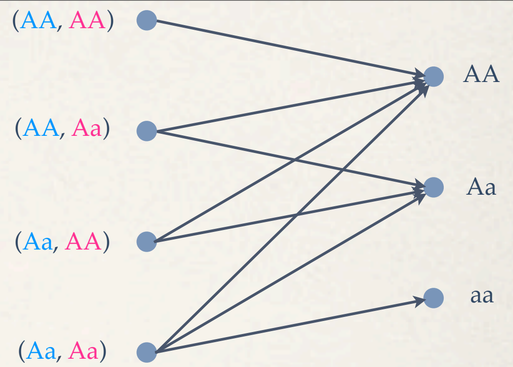

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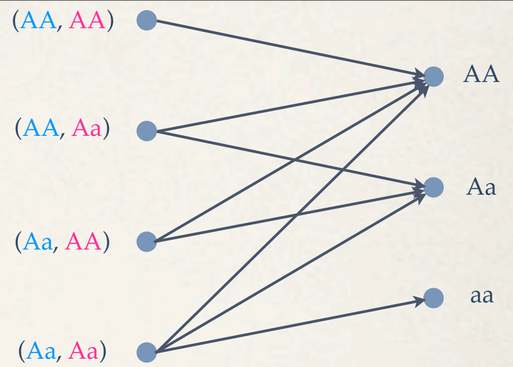

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Parental generation

Genotype frequency			
Genotype	AA	Aa	aa
Frequency	u	$2v$	w

Genotype frequency in mating population		
Genotype	AA	Aa
Frequency	$\frac{u}{1-w}$	$\frac{2v}{1-w}$

Gene frequency in mating population		
Gene	A	a
Frequency	$p = \frac{u+v}{1-w}$	$q = \frac{v}{1-w}$

$$u' = \left(\frac{u+v}{1-w}\right)^2$$

$$2v' = 2 \cdot \frac{u+v}{1-w} \cdot \frac{v}{1-w}$$

$$w' = \left(\frac{v}{1-w}\right)^2$$

Filial generation

Genotype frequency			
Genotype	AA	Aa	aa
Frequency	u'	$2v'$	w'

Genotype frequency in mating population		
Genotype	AA	Aa
Frequency	$\frac{u'}{1-w'}$	$\frac{2v'}{1-w'}$

Gene frequency in mating population		
Gene	A	a
Frequency	$p' = \frac{u'+v'}{1-w'}$	$q' = \frac{v'}{1-w'}$

Parental generation

Genotype frequency			
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Genotype frequency in mating population		
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Gene frequency in mating population		
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$$u' = \left(\frac{u+v}{1-w}\right)^2 = p^2$$

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Gene frequency in mating population		
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Parental generation

How does the frequency of the lethal gene change across generations?

Filial generation

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Frequency	u	$2v$	w

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Parental generation

How does the frequency of the lethal gene change across generations?

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Genotype frequency			
Genotype	AA	Aa	aa
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Gene	A	a
Frequency	$p' = \frac{u'+v'}{1-w'}$	$q' = \frac{v'}{1-w'}$

$$q' = \frac{v'}{1-w'} = \frac{pq}{1-q^2} = \frac{pq}{(1-q)(1+q)} = \frac{q}{1+q}$$

Parental generation

How does the frequency of the lethal gene change across generations?

Filial generation

Genotype frequency			
Genotype	AA	Aa	aa
Frequency	u	$2v$	w

$$u' = \left(\frac{u+v}{1-w}\right)^2 = p^2$$

Genotype frequency			
Genotype	AA	Aa	aa
Frequency	u'	$2v'$	w'

Genotype frequency in mating population		
Genotype	AA	Aa
Frequency	$\frac{u}{1-w}$	$\frac{2v}{1-w}$

$$2v' = 2 \cdot \frac{u+v}{1-w} \cdot \frac{v}{1-w} = 2pq$$

$$w' = \left(\frac{v}{1-w}\right)^2 = q^2$$

Genotype frequency in mating population		
Genotype	AA	Aa
Frequency	$\frac{u'}{1-w'}$	$\frac{2v'}{1-w'}$

Gene frequency in mating population		
Gene	A	a
Frequency	$p = \frac{u+v}{1-w}$	$q = \frac{v}{1-w}$

Gene frequency in mating population		
Gene	A	a
Frequency	$p' = \frac{u'+v'}{1-w'}$	$q' = \frac{v'}{1-w'}$

$$q' = \frac{v'}{1-w'} = \frac{pq}{1-q^2} = \frac{pq}{(1-q)(1+q)} = \frac{q}{1+q}$$

— or equivalently —

Parental generation

How does the frequency of the lethal gene change across generations?

Filial generation

Genotype frequency			
Genotype	AA	Aa	aa
Frequency	u	$2v$	w

$$u' = \left(\frac{u+v}{1-w}\right)^2 = p^2$$

Genotype frequency			
Genotype	AA	Aa	aa
Frequency	u'	$2v'$	w'

Genotype frequency in mating population		
Genotype	AA	Aa
Frequency	$\frac{u}{1-w}$	$\frac{2v}{1-w}$

$$2v' = 2 \cdot \frac{u+v}{1-w} \cdot \frac{v}{1-w} = 2pq$$

$$w' = \left(\frac{v}{1-w}\right)^2 = q^2$$

Genotype frequency in mating population		
Genotype	AA	Aa
Frequency	$\frac{u'}{1-w'}$	$\frac{2v'}{1-w'}$

Gene frequency in mating population		
Gene	A	a
Frequency	$p = \frac{u+v}{1-w}$	$q = \frac{v}{1-w}$

Gene frequency in mating population		
Gene	A	a
Frequency	$p' = \frac{u'+v'}{1-w'}$	$q' = \frac{v'}{1-w'}$

$$q' = \frac{v'}{1-w'} = \frac{pq}{1-q^2} = \frac{pq}{(1-q)(1+q)} = \frac{q}{1+q}$$

— or equivalently —

$$\frac{1}{q'} = \frac{1+q}{q} = \frac{1}{q} + 1$$