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Recap: representing rotations									
1/2		3x3 Matrix		Euler Angles					
Space efficient? (in RAM, GPU, storage)		★☆☆☆☆	9 scalars	*****	3 scalars (even as small int!)				
v to	Apply (to points/vectors)	★★★★☆	9 products (3 dot products)	★☆☆☆☆	requires trigonometry sin/cos				
/eas	Invert (produce inverse)	****	just transpose	★☆☆☆☆					
Efficient	Composite (with another rotation)	★★☆☆☆	Matrix multipl ^(9 dots) Numerical errors	★☆☆☆☆					
	Interpolate (with another rotation)	****	Introduces shear/scale	★☆☆☆☆ ea (/	asy to do, unintuitive result A shortest-path required!				
Intuitive? (e.g. to manually set)		★★★☆☆		****	roll yaw yitch				
Notes		Free extra shear + scale. Useful to extract local axes.		\wedge	GIMBAL LOCK				



Recap: representing rotations								
2/2		axis * angle	axis, angle	^(unitary) quaternion				
Space efficient? (in RAM, GPU, storage)		★★★☆ 3 scalars (precision needed)	★★★☆☆ 4 scalars (precision needed)	★★☆☆ 4 scalars (precision needed				
y to	Apply (to points/vectors)	★★★☆☆ requires trigonometry	★★★☆☆ requires trigonometry	★★★★ just 2 quat produc				
/eas	Invert (produce inverse)	★★★★★ just flip axis <i>or</i> angle	★★★★ just flip	★★★★ just conjugate				
cient	Composite (with another rotation)	★☆☆☆☆	★☆☆☆☆	★★★★ super easy: 1 quat product				
Effi	Interpolate (with another rotation)	★★★★★ easy + best result	★★★★★ easy* + best result	★★★☆ easy* + good resu (except angular speed)				
Intuitive?		***	★★★☆☆	★☆☆☆☆				
Notes		Typically used in physics.	sometimes not reall two representations for each rotation (for different reasons) (flip all → no effect) * Requires shortest path to interpolate					









GUI: how to author translations in 3D?
 translation gizmo

 handles to traslate along axes or planes

 handles to traslate along axes or planes
 convention: Red = X Green = Y Blue = Z





















Marco Tarini Università degli studi di Milano