



**ENGINEERING  
PROGRAM IN TECHNICAL  
COMMUNICATION**  
UNIVERSITY OF MICHIGAN

# Visual Syntax

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# Visual Syntax: Complexity of Communication

parallelism—small multiples—micro macro—layering<sup>1</sup>

<sup>1</sup>Edward Tufte .  
*Envisioning Information*.  
Graphics Press. 1990

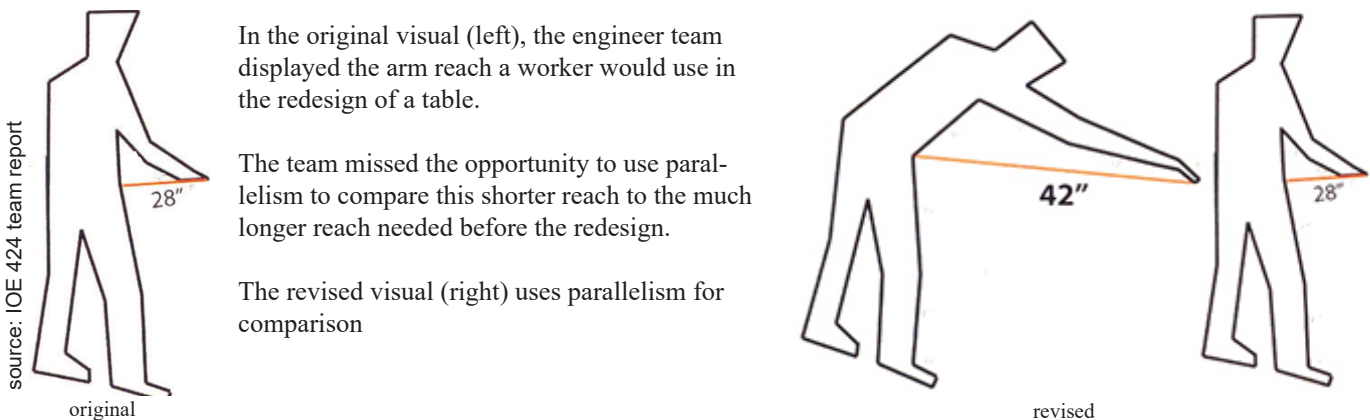
Our writing and speech are often a mix of simple, compound, and complex sentences. Mature writers use a mix of all three, but immature writers, such as many pre-schoolers, use only simple sentences. Skill in constructing complex sentences is a mark of maturity.

The identification of complexity = maturity can also apply to visual communication. This guide provides four examples of complex visual syntax.

**simple:**  
Tragedy began in Greece.  
+  
**simple:**  
It is the highest form of literary art.  
=  
**complex:**  
Tragedy, which began in Greece, is the highest form of literary art.

## 1. Parallelism: a :: b

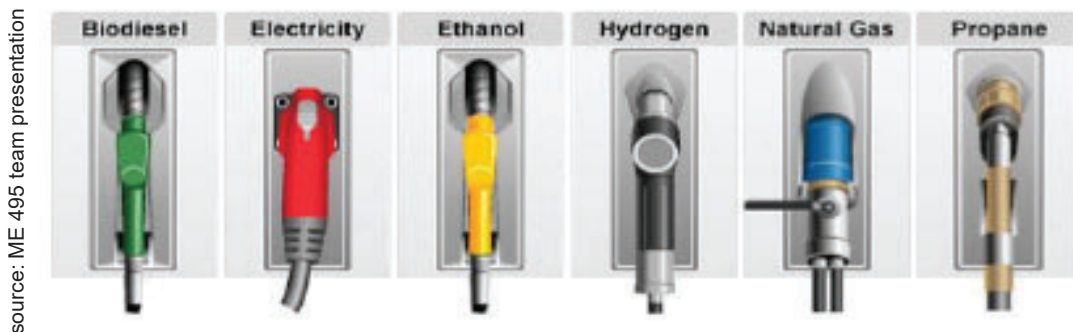
Engineers often miss an opportunity for complex visual syntax by not comparing an object to another, often its predecessor or revision.



## 2. Small multiples:

a b c d e f  
g h i j k l

The design principle of small multiples allows viewers to compare all possible options with each other in one eyespan. Small multiples is an expanded version of parallelism (compares only two).



The small multiples figure at left shows the choices of fuel nozzles for six different forms of energy for vehicles.

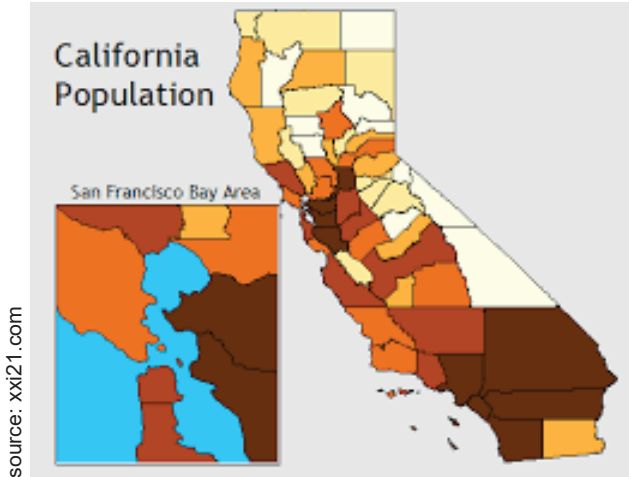
### 3. Micro Macro



The design strategy of micro macro shows the whole (macro) while also enabling individual readings (micro).

The common example of a micro macro shows the whole, in this case the state of California (below), but also shows the detail of an individual area, the San Francisco Bay Area.

The micro appears in relation to its position in the whole.



	<b>94</b>			
	<b>92</b>			
	<b>91</b>	<b>91</b>		
	<b>90</b>	<b>90</b>	<b>90</b>	
	<b>89</b>	<b>89</b>	<b>89</b>	<b>89</b>
	<b>88</b>	<b>88</b>		
AVG→	<b>87</b>			
	<b>86</b>	<b>86</b>	<b>86</b>	
	<b>85</b>	<b>85</b>		
	<b>83</b>	<b>83</b>		
	<b>82</b>	<b>82</b>		
	<b>78</b>			
	<b>76</b>			

Another micro macro can take the form of a stem-and-leaf diagram. The example at right, top, (Stem and leaf 1) shows the grade distribution of test scores. The macro view shows the whole distribution of scores, while each student can also see where his or her score fits among the others (the micro view).

The macro view of the two grade distributions below shows that the distribution on the left (Stem and leaf 2) could mean that the test was too easy; the distribution on the right (Stem and leaf 3) could mean the test was too hard.

	<b>94</b>				
	<b>92</b>	<b>92</b>	<b>92</b>	<b>92</b>	
	<b>91</b>	<b>91</b>	<b>91</b>	<b>91</b>	
	<b>90</b>	<b>90</b>	<b>90</b>	<b>90</b>	<b>90</b>
AVG→	<b>89</b>	<b>89</b>	<b>89</b>	<b>89</b>	
	<b>88</b>	<b>88</b>			
	<b>87</b>				
	<b>85</b>				
	<b>83</b>				
	<b>80</b>				
	<b>78</b>				

Stem and leaf 2

	<b>90</b>			
	<b>86</b>			
	<b>82</b>	<b>82</b>		
	<b>81</b>	<b>81</b>	<b>81</b>	<b>81</b>
	<b>80</b>	<b>80</b>	<b>80</b>	<b>80</b>
	<b>79</b>	<b>79</b>	<b>79</b>	
AVG →	<b>78</b>	<b>78</b>	<b>78</b>	<b>78</b>
	<b>75</b>	<b>75</b>		
	<b>72</b>			
	<b>71</b>	<b>71</b>	<b>71</b>	

Stem and leaf 3

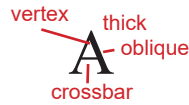
Stem and leaf 1

94	92	91	91	90
90	90	89	89	89
89	88	88	87	86
86	86	85	85	83
83	82	82	78	76

These test scores (left) arranged in a simple table (above) do not offer the interpretation of a micro macro.

#### 4. Layering

*Relationship among layers*



Three layers exist in the example at left:  
 1) white background  
 2) the letter A  
 3) red labels

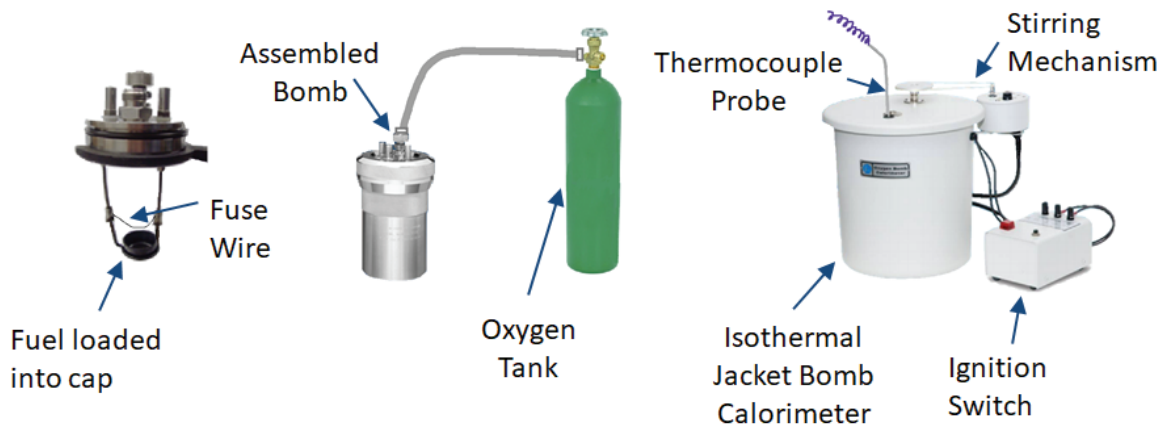
Layering seems easy, but engineers can harm a visual by not observing a clear relationship among its layers. Often, layering goes bad when labels and pointing lines blend with the visual.

The visual below left shows an ineffective relationship among layers. The featured labeled items compete with the unnecessary background items such as the tables, column, and room features.



source: ME 495 lab guide

The revised visual below presents the items differently for clarity. Nonessential items in the visual are removed. Labels are clearer. As the two visuals show, effective layering takes extra effort.



source: ME 495 team report

Another common ineffective practice of layering occurs when engineers import photos to a PowerPoint slide with a black or very dark background but do not convert the photo to a transparency.

Below left, the white background adds an unnecessary layer.

Below right, the white layer is removed.

Removing backgrounds can be easy in Microsoft products. Activate the image > Image Tools (in task bar) > Remove background (task bar, far left).



The four design strategies—parallelism, small multiples, micro macro, and layering—are based on lessons from Edward Tufte in *Envisioning Information*. Graphics Press. 1990.