Searching for $CAT(0)$ complexes, and where not to look

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Abstract: In their seminal work Masur and Minsky state that it is an interesting question whether the arc-and-curve complex admits a $CAT(0)$ metric. We will start by motivating this question further, and in particular, explaining the desire to go beyond already known $CAT(0)$ spaces e.g. (the completion of) the Weil–Petersson metric on Teichmueller space. We will then discuss where not to look for $CAT(0)$ spaces; we will show that the majority of arc complexes, and, all but finitely many disc complexes of handlebodies and free splitting complexes do not admit $CAT(0)$ metrics with finitely many/tractable shapes. Furthermore a possible strategy for dealing with the arc-and-curve complex will be discussed.