since f is one to one. ⅃

We thus obtain maps

$$f_* : \pi_1(M) \longrightarrow \pi_1(N)$$

and

$$f_*^{-1} : \pi_1(N) \longrightarrow \pi_1(M)$$

inverse to one another; and so $\pi_1(M) \cong \pi_1(N)$.

⌈

$$\begin{array}{cccc} f_* : & \pi_1(M) & \longrightarrow & \pi_1(N) \\ & \rotatebox{90}{$\in$} & & \\ & [\gamma] & & \\ & \| & & \\ & [\gamma'] & \longmapsto & [f(\gamma')] \end{array}$$

$\gamma' \cap V = \phi$ & $\gamma' \cap U = \phi$. $\gamma \sim \gamma'$ homotopic. ⅃

Another way in which a birational map carries structure is this: if $f : M \longrightarrow N$ is a birational map, we may define two maps

$$f_* : Div(M) \longrightarrow Div(N),$$

called the proper transform and the total transform. The proper transform of a divisor D in M is defined to be the closure in N of the image of D under f where defined, while the total transform is defined to be the image in N of the inverse image of D in the graph $\Gamma \subset M \times N$ of f.

⌈ If D is an irreducible hypersurface in M,
$f_*(D) = \overline{D - V}$, where f is defined away from $V \subset M$.